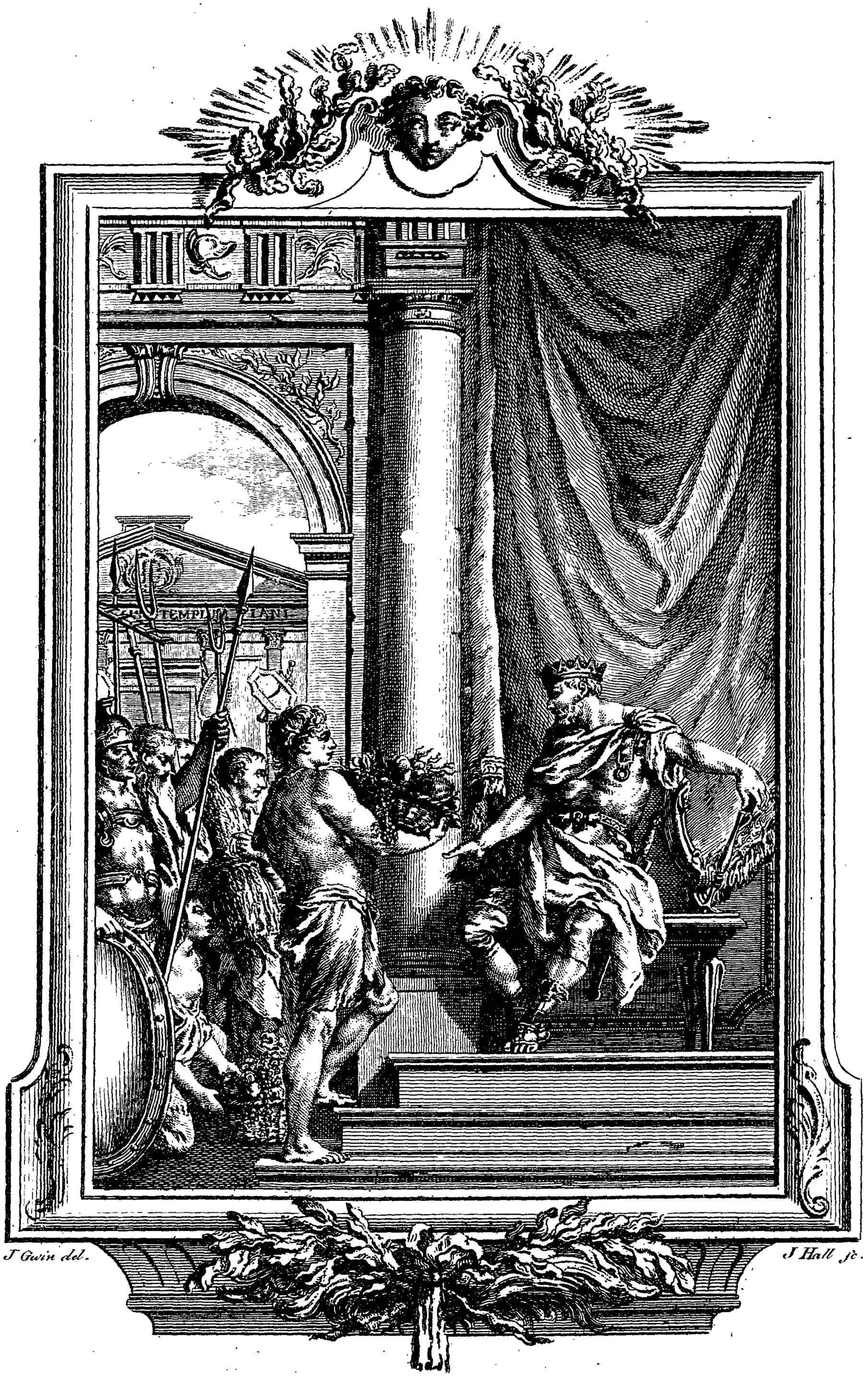


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By A SOCIETY of GENTLEMEN,

Members of the SOCIETY for the Encouragement of ARTS, MANUFACTURES, and COMMERCE.

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HUSBANDRY is, with great juſtice, placed at the head of human arts, as having a very great advantage over all others, both with regard to antiquity and uſefulneſs. It had its birth with the world, and has always been the genuine ſource of ſolid wealth, and real treaſures; for it will furniſh a people with every thing neceſſary to render life happy and deſirable, form the principal revenues of the ſtate, and even ſupply the defect of all others, when they happen to fail.

It is therefore no wonder that the wiſeſt princes, and the moſt able miniſters, among the ancients, made it their principal ſtudy to encourage and improve the Art of Huſbandry; they well knew that the ſtrength of a ſtate ſhould not be eſtimated by the extent of its territories, but by the number of its inhabitants, and the utility of their labours. And it ſhould be remembered, that ſome of the moſt noble conſuls and dictators among the ancient Romans were taken from the Plough, and that the ſenators of that flouriſhing people ſpent the greater part of their time in the country, where they tilled their fields with their own hands. "In thoſe happy times, ſays Pliny, the earth, pleaſed at ſeeing herſelf cultivated by the hands of triumphant victors, ſeemed to make ſtronger efforts, and to produce her fruit in greater abundance." Doubtleſs becauſe they applied themſelves to the taſk with greater attention, and took the wiſeſt precautions, to render their labours ſucceſsful: for when men of genius and abilities apply themſelves to any art, they ſoon make very great improvements, and advance it to a much higher degree of perfection: while the common people, by ſervilely confining themſelves to the common mode of practice, ſeldom make any farther progreſs in their profeſſion.

But when deſtructive luxury was introduced among the old Romans, Huſbandry declined, and has never ſince reached the honourable ſtation it before poſſeſſed: owing, in a great meaſure, to an opinion founded on falſehood, namely, that the Practice of Huſbandry requires neither ſtudy, reflection, nor precepts; and is therefore beneath the notice of men of fortune and genius. The ancients, however, thought very differently: they were perſuaded, that, in order to cultivate Lands to advantage, it was neceſſary to ſtudy the works of thoſe who had written on this ſubject, and to add the experience of others to their own. This opinion is now once more happily eſtabliſhed; and the Study of Huſbandry purſued with ſuch aſſiduity in different parts of Europe, that an amazing number of the moſt important diſcoveries have been lately made in that uſeful and neceſſary branch of knowledge.

ADVERTISEMENT.

But theſe uſeful Diſcoveries and Improvements are ſcattered through a multitude of volumes, written in different languages, and publiſhed in different countries; ſo that they can only be known to thoſe who have abilities to purchaſe, and leiſure ſufficient to peruſe ſo great a variety of books.

The authors of this undertaking were therefore perſuaded, that a Work, containing the Precepts relating to the Theory and Practice of every Branch of Huſbandry, delivered in the plaineſt and moſt intelligent manner, and enriched with all the Diſcoveries hitherto made in any part of Europe, would greatly tend to promote the Intereſt of their country. Filled with this pleaſing Idea, they chearfully undertook the laborious taſk; and have accordingly collected in this Dictionary all the valuable Precepts, Obſervations, Diſcoveries, and Improvements, contained in the writings of *Linnæus*, *Barck*, *Tarello*, *Duhamel*, *Chateauvieux*, *De Liſle*, the Marquis of *Turbilly*, *Fitz-Herbert*, *Hartlib*, *Platt*, *Evelyn*, *Houghton*, *Worlidge*, *Stillingfleet*, *Mortimer*, *Tull*, *Ellis*, *Miller*, *Hale*, *Liſle*, *Roque*, *Mills*, and ſeveral other Authors; together with thoſe publiſhed by the Societies of *Berne*, *Lions*, *Tours*, *Paris*, *Rouen*, *Edinburgh*, *London*.

And they hope it will be remembered, that this is the Firſt Attempt to give a COMPLETE SYSTEM of every branch of Huſbandry, and to blend in One Work the various Diſcoveries made in different nations. They alſo hope that the pains they have taken to inſert every thing belonging to the ſame ſubject in one article, and to range the whole in alphabetical order, will be approved of by the Public, as it evidently tends to facilitate the Study of Huſbandry, by enabling the Reader to find, with the greateſt eaſe and expedition, whatever ſubject he may be deſirous of conſidering.

The great number of large COPPER-PLATES with which this Dictionary is illuſtrated, muſt alſo prove a very valuable addition, and render it far ſuperior to any Treatiſe of this kind ever yet offered to the World; as it is impoſſible to convey an adequate idea of the various inſtruments, lately invented or improved for facilitating the practice of Huſbandry, without the aſſiſtance of large and accurate drawings. This has, however, rendered the work far more expenſive; but being determined to make it as complete as poſſible, they have ſpared nothing in their power to ſucceed; and the great ſucceſs the Work has already met with has demonſtrated, that they have not exerted themſelves in vain.



THE

THE

COMPLETE FARMER:

OR, A

GENERAL DICTIONARY

OF

HUSBANDRY.

A BELE-TREE, a ſpecies of poplar, growing naturally in all the temperate parts of Europe, and called by botaniſts *populus foliis lobatis dentatis ſubus tomentoſis.*

The leaves of the abele-tree are large, and divided into three, four, or five lobes, which are indented on their edges, of a very dark colour on their upper ſide, but very white and downy on their under, ſtanding upon foot-ſtalks about an inch long. The young branches have a purple bark, and are covered with a white down; but the bark of the ſtem and older branch is grey. In the beginning of April, the male flowers or catkins appear, which are cylindrical, ſcaly, and about three inches long; about a week after come out the female flowers, or catkins, which have no ſtamina like thoſe of the male. Soon after theſe come out, the male catkins fall off, and in five or ſix weeks after, the female flowers will have ripe ſeeds incloſed in a hairy covering; then the catkins will drop, and the ſeeds will be wafted by the winds a great diſtance. This tree is often confounded with the white poplar; but they are in reality diſtinct ſpecies.

The abele-tree may be propagated either by layers or cuttings, which will readily take root, or by ſuckers, which they ſend up from their roots in great plenty. The beſt time for tranſplanting theſe ſuckers is in October, when their leaves begin to decay. Theſe may be placed in a nurſery for two or three years to get ſtrength before they are planted out where they are deſigned to remain; but if they are propagated from cuttings, it is better to defer the work till February, at which time truncheons of two or three feet long ſhould be thruſt about a foot and a half into the ground. Theſe will readily take root, and if the ſoil, in which they are planted, be moiſt, will arrive to a conſiderable bulk in a few years.

A conſiderable advantage may be made by planting theſe trees upon boggy ſoils, where few other trees will thrive. Many ſuch places there are in England, which do not at preſent bring in much money to their owners; whereas, if they were planted with theſe trees, they would in a very few years, be of more value than the ground, clear of all expences; but there are many perſons, who think nothing, except corn, worth cultivating in England; or, if they plant timber, it muſt be oak, aſh, or elm; and if their land be not proper for either of theſe, it is conſidered as of little value: whereas, if the nature of the ſoil was examined, and proper ſorts of plants adapted to it, there might be very great advantages made of ſeveral large tracts of land, which at this time lie neglected.

The wood of the abele-tree is very good for floors, where it will laſt many years, and for its exceeding whiteneſs is, by many perſons, preferred to oak; but

being of a ſoft nature, is very ſubject to take the impreſſions of nails, &c. which renders it leſs proper for this purpoſe. It is alſo very good for wainſcoting rooms, being leſs ſubject to ſwell or ſhrink than moſt other woods; but for turnery-ware there is no wood equal to this for its exceeding whiteneſs. So that trays, bowls, and many other utenſils are made of it; the bellows-makers alſo prefer it for their uſe, as do alſo the ſhoe-makers for heels of ſhoes; it is likewiſe very good to make light carts, and the poles are very proper to ſupport hops, vines, &c. and the lopping will afford good fuel, which in many countries is much wanted. *Miller's Dict.*

The abele-tree is very proper for planting where you deſire a ſpeedy ſhelter and walks, it often making ſhoots of eighteen or twenty feet long in a year. *Mortimer's Huſbandry.*

ABLAQUEATION, the removing the earth, and laying bare the roots of fruit trees in winter, that they may be the more readily expoſed to the influence of rains, ſnow, air, &c. an operation formerly thought neceſſary for their future welfare; but experience has ſhewn it to be a dangerous practice, eſpecially where the trees are much expoſed to the winds, particul rly the ſouth-weſt, which are generally the moſt violent. The practice of ablaqueation is therefore with very good reaſon laid aſide in the preſent practice.

ABORTIVE CORN, a diſtemper of corn mentioned by Mr. Tillet, in a Diſſertation which gained the prize at the academy of Bourdeaux.

This diſtemper, ſays that ingenious naturaliſt, ſhews itſelf long before harveſt, when the ſtalk is not above eighteeen inches high; and may be known by a deformity of the ſtalk, the leaves, the ear, and even the grain.

The ſtem of abortive corn is generally ſhorter than that of other plants of the ſame age; it is crooked, knotted, and ricketty; the leaves are commonly of a bluiſh green colour, curled up in various forms; ſometimes turned like wafer cakes, and often rolled in a ſpiral form. The ears have very little of their natural form; they are lean, withered, and ſhew very imperfect rudiments, either of the chaff or grain.

All theſe ſymptoms are however only to be found in plants that are in the height of the diſtemper. The ſtalks are often pretty ſtrait, the leaves but little curled, and the chaff tolerably well formed; but inſtead of encloſing a ſmall embryo, white and ſoft at the ſummit, it contains only a green kernel terminating in a point, not unlike a young pea when forming in its pod.

Theſe abortive kernels have two or three points very viſible; they are then faſhioned as if two or three kernels were joined together at the baſe. When theſe kernels are ripe, or rather when they are dried up, they grow black, and ſo greatly reſemble the ſeeds of cockle, that huſbandmen, who are not acquainted with this diſtemper, often confound abortive wheat with the ſeeds of that weed.

This diſtemper M. Tillet ſuſpects to be occaſioned by inſects; for he perceived on the ſickly plants ſmall drops of a very limpid liquor, which he judged to be extravaſated ſap.

ACORNS, the fruit of the oak, and too well known to need any deſcription. *See* OAK.

Acorns are ſaid to have been the primitive food of mankind; but at preſent they are principally uſed in fattening hogs, for which they are very proper.

Some care is, however, neceſſary to be taken when hogs feed upon acorns, for otherwiſe they will be ſubject to a diſtemper called the garget. To prevent which, the beſt way is to moiſten ſome peaſe or beans with water, and ſprinkle over it ſome antimony pounded and ſifted; if this be repeated every other day for a fortnight or three weeks, it will effectually preſerve them from the diſorder. Or if the acorns be collected and prepared in the following manner, they may be given to hogs without any danger.

Dig a hole in the ground in a warm place, large enough to contain ſeveral buſhels of acorns; in this let the acorns be put, and well moiſtened with water, in which a handful or two of common ſalt has been diſſolved: in a few days they will begin to heat and ſpire: obſerve them therefore attentively, and when they have made a ſhoot about three inches long, take them out of the hole, and ſpread them to dry on a barn floor, and in a day or two they will be fit to be given to the hogs. This matter muſt, however, be managed with care and caution; they muſt not have too many given at a time; at firſt twice a day is often enough to feed them for a day or two; afterwards three times a day. Nor ſhould they, while they eat this food, be confined to a ſtye, but ſuffered to run at large; for if their liberty be too much abridged, they will never thrive well, or grow fat on acorns.

It is no uncommon thing in Hertfordſhire, with the management above directed, and the aſſiſtance of a little waſh, and a few grains now and then, for a farmer to kill ſeveral hogs in a ſeaſon, which ſhall weigh from eight to ten ſcore, and ſometimes even more.

Theſe hogs make very good meat, but it is not ſo fine as when the hogs are taken up, and four or five buſhels of peaſe or barley meal given to each, to complete their fattening before they are killed. *Muſeum Ruſticum, vol. I. p. 475.*

ACRE, a ſuperficial meaſure of land, containing, according to the ſtatute, one hundred and ſixty ſquare poles or perches, of ſixteen feet and a half long.

But this meaſure does not prevail in all parts of England; for though one hundred and ſixty ſquare poles or perches, are allowed to be an acre, yet the length of the pole varies in different counties, and is generally called cuſtomary meaſure.

Thus the cuſtomary perch in Staffordſhire is twenty-four feet. In the foreſt of Sherwood twenty-one. In Herefordſhire the perch of walling is ſixteen feet and a half; but a perch for digging twenty-one feet.

Old farmers alſo eſtimate the acre of land by the proportion of ſeed uſed in ſowing it; by which means it muſt vary in proportion to the fertility or barrenneſs of the ſoil; and hence in many counties of England they have two ſorts of acres, diſtinguiſhed by ſeed acres and ſtatute acres.

The French acre, or arpent, according to Mr. Greaves's calculation, conſiſts of 100 perches of twenty-two feet each, amounting to 48,400 ſquare French feet, which are equal to 51,691 ſquare Engliſh feet, or very near one acre, and three quarters of a rood, Engliſh meaſure.

The Iriſh acre is to the Engliſh, as 196 to 121. For the number of poles in each are the ſame; but the Iriſh pole

pole is twenty-one feet, whereas the Engliſh contains only ſixteen feet and a half: and the Welch acre is equal to two Engliſh ſtatute-acres.

ACREME, a quantity of land conſiſting of ten acres.

ADDERS-TONGUE, a weed growing in low moiſt meadows, where it is commonly hid among the graſs.

From a very low ſtalk ariſes a ſingle, thick, ſmooth, oblong leaf, from the bottom of which iſſues a kind of tongue, ending in a point, and indented on each ſide like a file.

ADZE, a kind of crooked axe uſed by carpenters, ſhipwrights, coopers, &c.

AFTERMATH, the ſecond crop, or graſs which ſprings up after mowing, or the graſs cut after the corn.

In the neighbourhood of London, the aftermath when made into hay, is of conſiderable value: but in haying this crop, ſo as to make it ſell well, great nicety is requiſite; the nature of the aftermath-graſs being more ſoft, ſpungy, and porous, than the firſt growth, and therefore more liable to be hurt by rains. *See* HAY.

AGE *of a horſe.* This is eaſily known by his mouth. till he comes eight, after which the uſual marks wear out. A horſe, like many other brute animals, has his teeth divided into three ranks, viz. his fore-teeth, which are flat and ſmooth, his tuſhes, and his back teeth. His back-teeth, or jaw-teeth, are called his grinders, being thoſe by which a horſe chews and grinds his provender, and are twenty-four in number, twelve above, and twelve below: they are ſtrong double teeth with ſharp edges; but when a horſe grows old, they wear much ſmoother.

The firſt that grows are his foal teeth, which begin to appear a few months after he is foaled: they are twelve in number, ſix above, and ſix below; and are eaſily diſtinguiſhed from the teeth that come afterwards, by their ſmallneſs and whiteneſs, not unlike the fore-teeth of a man.

When the colt is about two years and a half old, he caſts the four middlemoſt of his foal-teeth, viz. two above and two below; but ſome do not caſt any of their foal teeth till they are near three years old. The new teeth are eaſily diſtinguiſhed from the foal teeth, being much ſtronger, and always twice their ſize, and are called the nippers or gatherers, being thoſe by which a horſe nips off the graſs, when he is feeding abroad in the fields, or, in the houſe, gathers his hay from the rack. When a horſe has got theſe four teeth complete, he is reckoned three years old.

When he is about three and a half, or in the ſpring before he is four years old, he caſts out four more of his foal teeth, viz. two above, and two below, one on each ſide the nippers; or middle teeth: ſo that when you look into a horſe's mouth, and ſee the two middle teeth full grown, and none of the foal teeth, except the common teeth remaining, you may conclude he is four that year, about April or May. Some indeed are later colts, but that makes little alteration in the mouth.

The tuſhes appear near the ſame time with the four laſt mentioned teeth, ſometimes ſooner than theſe, and ſometimes not till after a horſe is full four years old: they are curved like the tuſhes of other beaſts, only in a young horſe they have a ſharp edge all round the top, and on both ſides, the inſide being ſomewhat grooved and flattiſh, inclined to a hollowneſs.

When a horſe's tuſhes do not appear for ſome time after the foal teeth are caſt out, and the new ones come in their room, it is generally owing to their foal teeth having been pulled out before their time, by the breeders or other dealers in horſes, to make a colt of three years old appear like one of four, that he may be the more ſaleable; for when any of the foal teeth have been pulled out, the others ſoon come in their places; but the tuſhes having none that go before them, can never make their appearance till their proper time, viz. when a horſe is about four, or coming four; and therefore one of the ſureſt marks to know a four year old horſe, is by his tuſhes, which are then very ſmall, and ſharp on the top and edges.

When a horſe comes five, or rather in the ſpring before he is five, the corner teeth begin to appear, and at firſt but juſt equal with the gums, being filled with fleſh in the middle. The tuſhes are alſo by this time grown to a more diſtinct ſize, though not very large: they likewiſe continue rough and ſharp on the top and edges. But the corner teeth are now moſt to be remarked; they differ from the middle teeth in being more fleſhy on the inſide, and the gums generally look rawiſh upon their firſt ſhooting out, whereas the others do not appear diſcoloured. The middle teeth arrive at their full growth in leſs than three weeks, but the corner teeth grow leiſurely, and are ſeldom much above the gums till a horſe is full five: they differ alſo from the other fore-teeth in this, that they ſomewhat reſemble a ſhell; and thence are called the ſhell teeth, becauſe they environ the fleſh in the middle half way round; and as they grow, the fleſh within diſappears, leaving a diſtinct hollowneſs and openneſs on the inſide. When a horſe is full five, theſe teeth are generally about the thickneſs of a crown piece above the gums. From five to five and a half they will grow about a qnarter of an inch high, or more; and when a horſe is full ſix, they will be near half an inch, and in ſome large horſes a full half inch above the gums.

The corner teeth in the upper jaw fall out before thoſe in the under, ſo that the upper corner teeth are ſeen before thoſe below; on the contrary, the tuſhes in the under gums come out before thoſe in the upper.

When a horſe is full ſix years old, the hollowneſs on the inſide begins viſibly to fill up, and that which was at firſt fleſhy grows into a browniſh ſpot, not unlike the eye of a dried garden bean, and continues ſo till he is ſeven; with this difference only, that the tooth is more filled up, and the mark, or ſpot, becomes faint, and of a lighter colour. At eight the mark in moſt horſes is quite worn out, though ſome retain the veſtiges of it a long time; and thoſe who have not had a good deal of experience, may ſometimes be deceived by taking a horſe of nine or ten years old for one of eight. It is at this time only, when a horſe is paſt mark, that one can eaſily err in knowing the age of a horſe; for what practices are uſed to make a very young horſe or colt appear older than he is, by pulling out the foal teeth before their time may be diſcovered by feeling along the edges where the tuſhes grow, for they may be felt in the gums before the corner teeth are put forth; whereas, if the corner teeth come in ſome months before the tuſhes riſe in the gums, we may reaſonably ſuſpect that the foal teeth have been pulled out at three years old.

It will perhaps, be needleſs to mention the tricks that

are uſed to make a falſe mark in a horſe's mouth, by hollowing the tooth with a graver, and burning a mark with a ſmall hot iron; becauſe thoſe who are acquainted with the true marks, will eaſily diſcover the cheat by the ſize and colour of the teeth, by the roundneſs and bluntneſs of the tuſhes, by the colour of the falſe mark, which is generally blacker, and more impreſſed than the true mark, and by many other viſible tokens, which denote the advanced age of a horſe.

After the horſe has paſſed his eighth year, and ſometimes at ſeven, nothing certain can be known by the mouth. It muſt, however, be remembered, that ſome horſes have but indifferent mouths when they are young, and ſoon loſe their mark; others have their mouths good for a long time, their teeth being white, even, and regular, till they are ſixteen years old and upwards, together with many other marks of freſhneſs and vigour; but when a horſe comes to be very old, it may be diſcovered by ſeveral indications, the conſtant attendants of age, viz. his gums wear away inſenſibly, leaving his teeth long and naked at their roots: the teeth alſo grow yellow, and ſometimes browniſh. The bars of the mouth, which in a young horſe are always fleſhy, and form ſo many diſtinct ridges, are, in an old horſe, lean, dry, and ſmooth, with little or no riſing. The eye-pits in a young horſe (except thoſe come of old ſtallions) are generally filled up with fleſh, look plump and ſmooth; whereas, in an old horſe, they are ſunk and hollow, and make him look ghaſtly, and with a melancholy aſpect. There are alſo other marks which diſcover a horſe to be very old, viz. grey horſes turn white, and many of them all over flea-bitten, except about their joints. This, however, happens ſometimes later, and ſometimes ſooner, according to the variety of colour and conſtitution. Black horſes are apt to grow grey over their eye-brows, and very often over a good part of their face, eſpecially thoſe who have a ſtar or blaze fringed round with grey when they are young. All horſes, when very old, ſink more or leſs in their backs, and ſome horſes, that are naturally long backed, grow ſo hollow with age, that it is ſcarce poſſible to fit them with a ſaddle. Of this kind are ſeveral Spaniſh and Barbary horſes, and many of the Daniſh and Flanders breed. Their joints alſo grow ſtiff with old age, and their knees and hocks bend ſo, that they are apt to trip and ſtumble upon the leaſt deſcent, though the way be ſmooth, and no ways rugged. After which they can be of little uſe to the owner. *Gibſon on Horſes.*

AGE *of neat cattle*, viz. *the ox*, *cow*, *and bull.* The age of theſe animals is known by the teeth and horns. At the end of ten months they ſhed their firſt fore-teeth, which are replaced by others, larger, but not ſo white; and in three years all the inciſive teeth are renewed. Theſe teeth are at firſt equal, long, and pretty white; but as the creatures advance in years, they wear, become unequal, and black. They alſo ſhed their horns at the end of three years; and theſe alſo are replaced by other horns, which, like the ſecond teeth, continue. The manner of the growth of theſe horns is not uniform, nor the ſhooting of them equal. The firſt year, that is the fourth year of the creature's age, two ſmall pointed horns make their appearance, neatly formed, ſmooth, and towards the head terminated by a kind of button. The following year this button moves from the head, being impelled by a horny cylinder, which lengthening in the ſame manner, is alſo terminated by another button, and ſo on: for the horns continue growing as long as the creature lives. Theſe buttons become annular joints, which are eaſily diſtinguiſhed in the horn, and by which the age of the creature may be eaſily known; counting three years for the point of the horn, and one for each of the joints. *Buffon's Hiſtoire Naturelle, tom.* IV.

AGE *of ſheep.* Theſe animals in their ſecond year have two broad teeth; in their third year they have four broad teeth before; in their fourth year ſix broad teeth, and in their fifth year eight broad teeth. After which none can tell how old a ſheep is while their teeth remain, except by being worn down. *Ellis on Sheep.*

At the end of one year, rams, ſheep, and weathers, loſe the two fore-teeth of the lower jaw; and they are known to want the inciſive teeth in the upper-jaw. At eighteen months the two teeth joining to the former, alſo fall out; and at three years, being all replaced, they are even and pretty white. But as the creature advances in age, they become looſe, blunt, and afterwards black. The age of the ram, and all horned ſheep, may alſo be known by their horns, which ſhew themſelves in their very firſt year, and often at the birth, and continue to grow a ring annually to the laſt period of the creature's life. *Buffon's Hiſtoire Naturelle, tom.* V.

AGE *of goats.* The age of goats is known by the ſame tokens as thoſe of the ſheep, viz. by their teeth, and the annular rings on their horns.

AGRICULTURE, the art of tilling, manuring, and cultivating the earth, in order to render it fertile.

This art claims the precedency of all others in point of antiquity, it having been the ſole employment of our firſt parents in the delightful garden of Eden.

Adam inſtructed his children in this neceſſary art, both by precept and example; and we are told by the ſacred hiſtorian, that Cain applied himſelf to huſbandry, while Abel led the life of a ſhepherd, and contented himſelf with feeding his flocks.

After the deluge the deſcendants of Noah carried with them the art of huſbandry, and eſtabliſhed it in the various countries where they ſettled. It was, however, very ſimple in theſe early ages, and its advances towards perfection ſlow and almoſt imperceptible.

Abraham, and the reſt of the patriarchs, who had no fixed reſidence, applied themſelves to a paſtoral life, ennobling, by their example, a profeſſion, which has now for many ages loſt its original dignity, from its being practiſed only by the meaner ſort of people. But as ſoon as their deſcendants were fixed in Paleſtine, they all became huſbandmen, from the chief of the tribe of Judah, to the loweſt branch of the family of Benjamin: birth at that time made no diſtinction, and agriculture was conſidered as a very honourable employment.

The Chaldeans, who inhabited the countries where agriculture had its birth, carried that valuable art to a conſiderable degree of perfection: they cultivated their lands with great aſſiduity, and enjoyed the pleaſing ſatisfaction of receiving from their fields a very plentiful harveſt. The Egyptians, who from the fertility of their country, cauſed by the annual overflowings of the Nile, raiſed prodigious quantities of corn, were ſo ſenſible of the bleſſings reſulting from agriculture, that they aſcribed the invention of it to Oſiris; and even carried their ſuperſtitious gratitude ſo far, as to worſhip thoſe animals that laboured in tilling the ground.

The Phœnicians, ſo well known in the ſacred writings by the name of Philiſtines, were alſo famous for their ſkill in agriculture; but finding themſelves too much confined in their native country by the conqueſts of the Iſraelites, they ſpread themſelves through the greater part of the iſlands of the Mediterranean, and carried with them their knowledge in huſbandry.

The Carthaginians followed the taſte of their anceſtors, and applied themſelves aſſiduouſly to the ſtudy of agriculture. Mago, their famous general, wrote no leſs than twenty-eight books on that ſubject, and which Columella tells, us were tranſlated into Latin by an expreſs decree of the Roman ſenate. Servius adds, that Virgil uſed theſe books as a model when he wrote his Georgics.

The ancients tell us, that the goddeſs Ceres was born in Sicily, where ſhe invented the art of ſowing corn, and the tillage of land. The meaning of this fable is very evident; that iſland was very fruitful in corn, and agriculture was there eſteemed ſo honourable an employment, that even their kings did not diſdain to practiſe it with their own hands.

But time, which at firſt gave birth to arts, often cauſed them alſo to be forgotten, when they were removed from the place of their origin. The children of Noah, who ſettled in Europe, doubtleſs carried with them the knowledge of agriculture; but their deſcendants, who took poſſeſſion of Greece, were ſuch a ſavage race, that they fed on herbs, after the manner of beaſts. Pelaſgus taught them the culture of the oak, and the uſe of acorns as food, for which divine honours were paid him.

The Athenians, who were the firſt that received any tincture of politeneſs, taught the uſe of corn to the reſt of the Greeks; they alſo taught them the manner of cultivating the ground, and preparing it for the ſeed. The Greeks ſoon perceived that bread was more wholeſome, and its taſte more delicate than acorns; and accordingly thanked the gods for ſuch an unexpected and beneficial preſent. After this the Athenian kings thinking it more glorious to govern a ſmall ſtate wiſely, than to aggrandize themſelves by foreign conqueſts, withdrew their ſubjects from war, and employed them ſolely in cultivating the earth. This conſtant application carried agriculture to a conſiderable degree of perfection, and ſoon reduced it into an art.

Heſiod, who is generally thought to have been cotemporary with Homer, was the firſt among the Greeks who wrote on this ſubject. He calls his poem "Works and Days;" becauſe agriculture requires exact obſervations of times and ſeaſons.

The other eminent Greek writers upon agriculture, are Democritus of Abdera, Socraticus, Xenophon, Tarentinus, Architas, Ariſtotle, and Theophraſtus, from whom the art received conſiderable improvements; as alſo from Hieron, Epicharmus, Philometor, and Attalus.

The old Romans eſteemed agriculture ſo honourable an employment, that in the earlieſt times of the republic, the higheſt praiſe that could be given a man, was to ſay of him, that he cultivated well his own ſpot of ground. The moſt illuſtrious ſenators applied themſelves to this profeſſion; nor had they either ſplendor or majeſty, but when they appeared in public. And their greateſt generals, at their return from the toils of war, from taking of cities, and ſubduing of nations, were impatient till they were again employed in cultivating their lands, and thought it no diſgrace to follow the plough, though they were at the ſame time prepared to ſerve the wants of the republic, attend her councils, or put themſelves at the head of her armies.

It muſt indeed be allowed, that when the Romans became tainted with the luxury of Aſia, they gradually loſt the noble ſimplicity of their anceſtors, and employed their ſlaves in the ſeverer labours of a country life. But though they did not themſelves hold the plough, yet even men of conſular dignity looked upon it as a reward for their public ſervices, when they obtained leave to retire into the country, and were equally reſpected when overlooking their farms, as when ſeated in the chair of magiſtracy. M. Cato, the cenſor, that illuſtrious Roman general, orator, politician, and lawyer, after having governed provinces, and ſubdued nations, did not think it below his ſtation to write a large treatiſe on agriculture.

This work, according to Servius, was dedicated to his own ſon, and was the firſt Latin treatiſe on that ſubject. This work has been handed down to us in all its purity, in the ſame manner as Cato wrote it. Varro compoſed a treatiſe on the ſame ſubject, and on a more regular plan. This work is embelliſhed with all the Greek and Latin erudition of that learned author.—Agriculture alſo received great improvements from the two Saſernaes, and likewiſe from Scorſa, Tremellius, and M. Terentius. Virgil has adorned it with the language of the muſes, and given it majeſty by his verſe. He has finely embelliſhed the precepts of huſbandry left by Heſiod and Mago.

Columella, who flouriſhed in the reign of the emperor Claudius, wrote twelve book on huſbandry. He was a native of Bœtica in Spain, and had devoted his time to the ſtudy of huſbandry.

From this time till the reign of Conſtantine IV. huſbandry continued in a declining ſtate, when that wiſe emperor cauſed a large collection of the moſt uſeful precepts relating to agriculture to be extracted from the beſt writers, and publiſhed under the title of Geoponics.—Some ſay he made this collection with his own hand. Nor is this at all improbable, as it is well known, that after he had conquered the Saracens and Arabians, he not only practiſed, but ſtudied the arts of peace, fixing his chief attention on the advancement of huſbandry.

But from the time of Conſtantine IV. till about the year 1478, agriculture lay in a kind of dormant ſtate, when Creſcenzio publiſhed an excellent performance on agriculture at Florence. He was ſoon followed by ſeveral of his countrymen, among whom Tatti, Stefano, Auguſtino Gallo, Sanſovino, Lauro, and Tarello, deſerve particular honour.

In the mean time Fitz-Herbert, judge of the Common Pleas, ſhone with unrivalled luſtre in the practical parts of huſbandry. He publiſhed two treatiſes on this ſubject; the firſt, which was entitled, The book of Huſbandry, appeared 1534, and the ſecond, called, The Book of Surveying and Improvements, in 1539.

Fitz-Herbert's books of Agriculture ſoon raiſed a ſpirit of emulation in his countrymen, and many treatiſes of the ſame kind ſucceſſively appeared; but time has deprived us of many of thoſe writings, or at leaſt they are become ſo very ſcarce, as only to be found in the libraries of the curious.

About the year 1600, France made ſome conſiderable efforts to revive huſbandry, as appears from ſeveral large works

works, particularly *Les Moyens de devenir Riche*, and the *Coſmopolite*, by Barnard de Paliſſy, a poor potter; *Le Theatre d'Agriculture*, by de Serres; *L'Agriculture, & Maiſon Ruſtique*, by Meſſrs. Etienne and Liebault, &c.

The Flemings, about the ſame period, dealt more in the practice of huſbandry, than in publiſhing books on the ſubject; ſo that their intention doubtleſs was to carry on a private lucrative trade, without inſtructing their neighbours: and hence it happened, that whoever was deſirous of copying their method of agriculture, was obliged to travel into their country, and make his own remarks. The principal, and indeed juſt, idea of huſbandry conſiſted in this, namely, to make a farm reſemble a garden as near as poſſible. Such an excellent principle at firſt ſetting out, led them of courſe to undertake the culture of ſmall eſtates only, which they kept free from weeds, continually turning the ground, and manuring it plentifully and judiciouſly.

When they had by this method brought the ſoil to a proper degree of cleanlineſs, health, and ſweetneſs, they ventured chiefly upon the culture of the more delicate graſſes, as the ſureſt means of acquiring wealth in huſbandry upon a ſmall eſtate, without the expence of keeping many draught horſes or ſervants.

A few years experience was abundantly ſufficient to convince them, that ten acres of the beſt vegetables for feeding cattle, properly cultivated, would maintain a larger ſtock of grazing animals, than forty acres of common farm graſs. They alſo found that the beſt vegetables for this purpoſe were lucern, ſainfoin, trefoil of moſt denominations, ſweet fenugreek, buck and cow-wheat, field turnips, and ſpurrey.

The political ſecret of their huſbandry therefore, conſiſted in letting farms on improvement. They alſo diſcovered eight or ten new ſorts of manure. They were the firſt among the moderns who ploughed in living crops for the ſake of fertilizing the earth, and confined their ſheep, at night, in large ſheds built on purpoſe, whoſe floors were covered with ſand or virgin earth, &c. which the ſhepherd carted away every morning to the compoſt dunghill.

Our fatal domeſtic wars, during the reign of Charles I. changed the inſtruments of huſbandry into martial weapons; but after the death of that unfortunate monarch, artful and avaricious men crept into the confiſcated eſtates of the nobility, gentry, and clergy; and as many of theſe new encroachers had riſen from the plough, ſo they returned with pleaſure to their old profeſſion, being chiefly animated by the love of gain. Plattes, Hartlib, Blythe, and others, ſeized this favourable diſpoſition of the common people, and encouraged it by writings, which have ſince had few equals; nor was Cromwell wanting to lend his aſſiſtance.

Sir Hugh Platt was one of the moſt ingenious huſbandmen of the age in which he lived; yet ſo great was his modeſty, that all his works, except his Paradiſe of Flora, ſeem to be poſthumous. He held a correſpondence with all the lovers of agriculture and gardening in England; and ſuch was the juſtice and modeſty of his temper, that he always named the author of every diſcovery communicated to him. Perhaps no man, in any age, diſcovered, or, at leaſt, brought into uſe ſo many new ſorts of manure. Witneſs his account of the compoſt and covered dunghill, and his obſervations on the fertilizing qualities lodged in ſalt, ſtreet-dirt, and the ſullage of ſtreets in great cities, clay, fuller's-earth, mooriſh earth, dunghills made in layers, fern, hair, calcination of all vegetables, malt duſt, willow-tree earth, ſoap-boilers aſhes, marle, and broken pilchards.

Gabril Plattes may be eſteemed an original genius in huſbandry. He began his obſervations in the time of queen Elizabeth, and continued them through the reigns of James I. Charles I. and during the firſt three or four years of the common-wealth. But notwithſtanding the great merit of this writer, the public ſuffered him to ſtarve and periſh in the ſtreets of London; nor had he a ſhirt upon his back when he died.

Samuel Hartlib, a celebrated writer on huſbandry in the laſt century, was highly beloved and eſteemed by Milton, and other great men of that time. In his preface to a work commonly called his Legacy, he laments that no public director of huſbandry was eſtabliſhed in England by authority; and that we had not adopted the Flemiſh method of letting farms upon improvement. This remark of Hartlib procured him a penſion of one hundred pounds a year from Cromwell; and the writer afterwards the better to fulfill the intention of his benefactor, procured Dr. Beati's excellent annotation on the Legacy, with other valuable pieces from his numerous correſpondents.

About the time when this author flouriſhed ſeems to have been an æra when the Engliſh huſbandry roſe to great perfection; for the preceding wars had made the country gentry poor, and, in conſequence thereof, induſtrious. They found the cultivation of their own lands to be the moſt profitable poſt they could occupy. But a few years after, when the reſtoration took place, all this induſtry and knowledge were exchanged for diſſipation and heedleſſneſs; and then huſbandry paſſed almoſt entirely into the hands of farmers.

The famous work attributed to Hartlib, and called the Legacy, was only drawn up at Hartlib's requeſt; and, after paſſing through his correction and reviſal, was publiſhed by him. The real author of this treatiſe was R. Child. It conſiſts of one general anſwer to the following queſtion, namely, "What are the actual defects and omiſſions, as alſo the poſſible improvements in Engliſh huſbandry?"

Several other pieces on huſbandry followed the publication of the Legacy, and greatly improved that neceſſary and uſeful art.

The firſt writer that inſpired his countrymen with a deſire of reviving the ſtudy of agriculture after the reſtoration, was Evelyn; who, being followed by the famous Tull, opened a new ſphere for the minds of mankind to range in; and ſince this period ſeveral valuable improvements have been made in the Engliſh huſbandry, by a great variety of authors.

Ireland, about the middle of the laſt century, began to make no inconſiderable figure in the art of huſbandry. It muſt, indeed, be confeſſed that Ireland had very ſtrong prejudices in behalf of a very wretched method of agriculture, till about the middle of the laſt century, when Blythe opened the eyes of that people by his incomparable writings. Since which a certain ſpirit of improvement has, more or leſs, been promoted and carried on with great zeal and conſtancy by the nobility, clergy, and gentry of that kingdom. In proof of which it will be ſufficient to obſerve, that the tranſactions of the Dublin ſociety for encouraging huſbandry, are now cited

cited by all foreigners in the memoirs relating to that ſubject.

After the peace of Aix-la-Chapelle, almoſt all the nations of Europe, by a ſort of tacit conſent, applied themſelves to the ſtudy of agriculture; and continued to do ſo, more or leſs, amidſt the univerſal confuſion that ſoon ſucceeded. The French found, by repeated experience, that they could never maintain a long war, or procure a tolerable peace, without they raiſed corn enough to ſupport themſelves in ſuch a manner as they ſhould not be obliged to ſubmit to harſh terms on the one hand, or periſh by famine on the other. Their king, therefore, thought proper to give public encouragement to agriculture, and has even been preſent at the making of ſeveral experiments. The great and rich, of various ranks and ſtations, followed this example, and the very ladies put in for their ſhare of fame in this commendable undertaking. Even during the hurry and diſtreſſes of the laſt war, ſome attention was paid to agriculture. Prize queſtions were then propoſed annually in rural academies, particularly at the two academies of Lyons and Bourdeaux. And many alterations were made by the ſociety for improving agriculture in Britany.

Since the concluſion of the peace, matters have been carried on with great vigour. The univerſity of Amiens has made various propoſals to the public for the advancement of huſbandry; while the marquis de Tourbilly, a writer who proceeds chiefly on experience, has the principal direction of a georgical ſociety, lately eſtabliſhed at Tours.

The ſociety of Rouen alſo deſerves our notice: nor have the king and his miniſters thought it unworthy their notice. The archbiſhop of the dioceſe is one of the members.

We ſhall only add on this ſubject, that there are at preſent thirteen ſocieties exiſting in France, eſtabliſhed by royal approbation, for the promoting of agriculture; and theſe thirteen ſocieties have nineteen co-operating ſocieties belonging to them, whenever it happened that a diſtrict was too large to be effectually taken care of by one ſociety.

The art of agriculture is, at preſent, publickly taught both in the Swediſh, Daniſh, and German univerſities, where the profeſſors may render effectual ſervice to their reſpective countries, if they underſtand the practical as well as the ſpeculative parts, and can converſe to as much advantage with the farmer and peaſant, as with Virgil and Columella.

Nor has Italy been inactive. The Neapolitans of the preſent age have condeſcended to return back to the firſt rudiments of revived huſbandry, and begun to ſtudy afreſh the agriculture of Creſcenzio, firſt publiſhed in the year 1478. The people of Bergamo have purſued the ſame track, and given the world a new edition of the *Ricordo d'Agricultura di Tarello*, which was originally publiſhed at Mantua in 1577.

The dutchy of Tuſcany has embibed the ſame ſpirit. A private gentleman has lately left his whole fortune to endow an academy of agriculture. The firſt eccleſiaſtic in that duchy is preſident of the ſociety, and many of the chief nobility are members. Even Ferrara, a ſmall territory in the papal dominions, has contributed its juſt contingent, and made ſome laudable attempts in huſbandry.

Animated with a deſire that the people under his government ſhould excel in huſbandry, his Sardinian majeſty has ſent ſubjects to learn the practice of foreign countries, and made ſeveral attempts to eſtabliſh a better method of agriculture among his ſubjects.

In Poland, where a natural fertility of ſoil ſeems to diſpenſe with the neceſſity of calling in improvements, Mr. de Bieleuſki, grand-marſhal of the crown, has made abundance of ſucceſsful attempts to introduce the new huſbandry among his countrymen, and procured the beſt inſtruments for that purpoſe from France and other parts of Europe.

The Hollanders give little attention to agriculture, if we except one ſingle collateral inſtance, namely, the draining of fens and moraſſes; and even that has proceeded more from the motive of ſelf-preſervation, than any particular turn towards huſbandry.

In the year 1759, a ſociety eſtabliſhed itſelf at Berne, in Switzerland, for the advancement of agriculture, and rural œconomics. That ſociety conſiſts of many ingenious private perſons, and alſo of ſome of great weight and influence in the republic; moſt of them men of a true caſt for the improvement of huſbandry, being enabled to join the practice with the theory. They have already publiſhed ſeveral uſeful pieces, which we ſhall be careful to inſert under their proper heads.

We muſt not omit to mention here, that Linnæus and his diſciples have performed great things in the north of Europe, particularly in diſcovering new, profitable, and well-taſted food for cattle. At the ſame time Sweden has augmented a commerce that had been long cramped within narrow bounds, and beſtowed ſucceſsful labours on a ſoil, which was before looked upon as cold, barren, and incapable of melioration; of this the late memoirs publiſhed at Stockholm will be a laſting monument.

Denmark, as well as many courts in Germany, follow the like example. His Daniſh majeſty encourages, in particular, the woollen manufacture; and the late king ſent three perſons into Arabia Felix, to make remarks, and bring over ſuch plants and trees as may be uſeful in huſbandry, building, &c.

At the ſame time the duchy of Wirtemberg, a country no ways unfavourable to corn and paſturage, has not failed to contribute its aſſiſtances towards the improvement of agriculture, having ſome time ago communicated to the public its œconomical relations from the preſs at Stutgard.

Nor have the learned of Leipſic and Hanover been inattentive to this great art of ſupporting human kind, and that amidſt all the rage and devaſtations of war; witneſs the *Journal d'Agriculture*, printed at Leipſic, and the *Recueils d'Hanovre*, printed at that city.

Even Spain, naturally inactive on theſe occaſions, in ſpite of all the prejudices of a bigotted religion, has invited Linnæus, with the offer of a large penſion, to ſuperintend a college, founded for the ſake of making new enquiries into the hiſtory of nature, and the art of agriculture.

But England alone exceeds all modern nations in huſbandry; and there is reaſon to hope, from the ſpirit that now animates a great number of the nobility and gentry, that this uſeful art will, in a few years, be carried to a much greater degree of perfection than it ever yet reached in any age or country. The reſpectable patriots that form the ſociety eſtabliſhed at London, for the

the encouragement of arts, ſeem determined to contribute all that lies in their power towards the advancement of agriculture. They have already done much, and there is reaſon to hope they will do more. A vaſt variety of different machines for facilitating the practice of agriculture, have been ſent them in conſequence of their large premiums and bounties. Such munificence and attention to public proſperity may be truly called royal, as it would caſt a luſtre on the greateſt monarch that ever ſwayed a ſceptre. We ſhall conclude this hiſtory, with obſerving, that the reader will find under the proper articles, a more minute account of the various improvements that have been lately made in the different parts of Europe.

AGRIMONY, a troubleſome perennial plant in paſture grounds. It has generally a ſingle, round, rough ſtalk, with leaves placed alternately upon it, which are winged with ſmaller leaves placed between the larger pairs. The yellow flowers grow alternately along the ſtalk, in a long row, after the manner of a ſpike, and are ſucceded by rough ſeeds.

AIR, that thin, dilatable, and compreſſible body in which we breathe, and which ſurrounds the earth to a great height.

The air, beſides its various other uſes, is a principal cauſe of the vegetation of plants, an inſtance of which we have from Mr. Ray, in the Philoſophical Tranſactions, of lettuce-ſeed, that was ſown in the glaſs receiver of the air-pump, which was exhauſted, and cleared from all air, which grew not at all in eight days time; whereas ſome of the ſame ſeed, that was ſown at the ſame time in the open air, was riſen to the height of an inch and an half in that time; but the air being let into the exhauſted receiver, the ſeed grew up to the height of two or three inches in the ſpace of one week.

Another inſtance of the uſefulneſs of the air in vegetation, is the ſedum, which will puſh out roots without earth and water, and live for ſeveral months: and ſome ſort of aloes, if hung up in a room entirely ſecured from froſts, will remain freſh for ſome years, though they will ſenſibly loſe in their weight. Air is capable of penetrating the porous and ſpongy parts of plants, and being there contracted, of dilating itſelf again.

The air operates alſo within the bowels of the earth, and, by its ſubtilty perſpiring through the pores, aſſiſts in the rarefaction, of the crudities of the earth, and in the diſpelling all ſuperfluous moiſture, entering into the very pores and veins of the trees, plants, herbs, &c. carrying along with it thoſe ſalts contained either in itſelf, or lodged in the earth: which ſalts or juices are altered according to the ſeveral figures or dimenſions of the different ſtrainers or veſſels of thoſe ſeveral plants which grow upon the ſame ſpot of earth, which is ſo impregnated with theſe ſalts: and thence thoſe varieties in taſte and ſmell proceed, notwithſtanding they all receive their nouriſhment from the ſame ſtock that is lodged in the earth.

The air alſo affects the branches, leaves, and flowers of trees, plants, and herbs, entering and perſpiring through them, and even through the bark and body of trees: and by the ſame kind of ſubtilty it does, by its refreſhing breezes, moderate the intenſeneſs of the ſunbeams, cooling, chearing, blowing, opening, and extending all the offspring of nature. The air fixes and inſinuates its æreal ſubſtance into the liquid ſap of vegetables: and, as all the agitations in nature proceed from the contrariety of parts inhabiting together, in this æreal and liquid ſubſtance, being mixed, cauſe the agitation and motion in vegetables, or, more properly, ſet it all into a ferment, whether it be in the roots, or in the ſtem; and it riſes by co-operation of the ſun, which is the third agent in vegetation, up to the top of a tree, &c. as liquids riſe by fire to the top of the containing veſſel.

The air, we find, produces a vibratory motion in ſeveral bodies; and, particularly in plants, the air-veſſels thereof perform the office of lungs: for the air contained in them ſometimes contracting, and ſometimes expanding, according as the heat is increaſed or diminiſhed, preſſes the veſſels, and eaſes them again by turns, and thus promotes a circulation of their juices, which could ſcarce be otherwiſe effected.

Air, ſays the learned Dr. Hales, is a fine elaſtic fluid, with particles of very different natures floating in it, whereby it is admirably fitted by the great author of nature, to be the breath or life of vegetables, as well as animals, without which they can no more live nor thrive than animals can. As a proof of the great quantities of air in vegetables, he refers to the third chapter of his excellent Treatiſe of Vegetable Statics, where, he ſays, in the experiments on vines, the great quantities of air was viſible, which was continually aſcending through the ſap into the tubes; which manifeſtly ſhews what plenty of it is taken in by vegetables, and is perſpired off with the ſap through the leaves.

He adds ſeveral experiments, as to an apple-branch, apricot-branch, birch, and other plants, to prove the ſame thing.

And Dr. Grew has obſerved, that the pores are ſo large in the trunks of ſome plants, as in the better ſort of thick walking canes, that they are viſible to a good eye without a gaſs; but, with a glaſs, the cane ſeems as if ſtuck at top full of holes with great pins, ſo large as very well to reſemble the pores of the ſkin in the ends of the fingers, and ball of the hand.

In the leaves of pines, they likewiſe, through a glaſs, make a very elegant ſhew, ſtanding almoſt exactly in rank and file, through the length of the leaves. Whence it may be thought probable, that the air freely enters plants, not only with the principal fund of nouriſhment by the roots, but alſo through the ſurface of their trunks and leaves, eſpecially at night, when they are changed from a perſpiring, to a ſtrongly imbibing ſtate.

Dr. Hales likewiſe tells us, that in all thoſe experiments that he tried to this purpoſe, he found that the air entered very ſlowly at the bark of young ſhoots and branches, but much more freely through old bark; and that in different kinds of trees it had different degrees of more or leſs free entrance.

And likewiſe, that there is ſome air both in an elaſtic and unelaſtic ſtate, mixed with the earth (which may well enter the roots with the nouriſhment) he found by ſeveral experiments, which he gives in the abovementioned treatiſe.

The excellent Mr. Boyle, in making many experiments on the air, among other diſcoveries, found, that a good quantity of air was produceable from vegetables, by putting grapes, plumbs, gooſeberries, peas, and ſeveral other ſorts of fruits and grain, into exhauſted and unexhauſted

unexhauſted receivers, where they continued for ſeveral days emitting great quantities of air.

This put the curious Dr. Hales upon further reſearches to find out what proportion of air he could obtain out of the vegetables in which it was lodged and incorporated; and, from a vaſt variety of curious and accurate experiments, concludes, that air abounds in vegetable ſubſtances, and bears a conſiderable part in them: and, that if all parts of matter were only endowed with a ſtrongly attracting power, all nature would then become one unactive cohering lump.

Wherefore it was abſolutely neceſſary, in order to the actuating this vaſt maſs of attracting matter, that there ſhould be every where mixed with it a due proportion of ſtrongly repelling elaſtic particles, which might enliven the whole maſs, by the inceſſant action between them and the attracting particles.

And ſince theſe elaſtic particles are continually in great aburdance reduced by the power of the ſtrong attracters, from an elaſtic to a fixed ſtate, it was therefore neceſſary, that theſe particles ſhould be endued with a property of reſuming their elaſtic ſtate, whenever they were diſengaged from that maſs in which they were fixed that thereby this beautiful frame of things might be maintained in a continual round of the production and diſſolution of vegetable, as well as animal bodies.

The air is very inſtrumental in the production and growth of vegetables, both by invigorating their ſeveral juices, while in an elaſtic active ſtate, and alſo by greatly contributing, in a fixed ſtate, to the union and firm connection of the ſeveral conſtituent parts of thoſe bodies, viz. their water, fire, ſalt and earth.

To conclude, by reaſon of thoſe properties of the air before-mentioned, it is very ſerviceable to vegetables, in that it collects up and breaks open the clouds, thoſe treaſures of rain, which nouriſh the vegetable tribe.

The air alſo helps to waft or diſperſe thoſe foggy humid vapours which ariſe from the ſoil, and would otherwiſe ſtagnate, and poiſon the whole face of the earth.

The air, by the aſſiſtance of the ſun, aſſumes and ſublimates thoſe vapours into the upper regions; and theſe foggy humid vapours are, by this ſublimation, and the coercive power of the air and ſun, rarefied, and made again uſeful in vegetation.

On the contrary, the air, which in ſo many ways is ſubſervient to vegetables, is alſo, upon ſome accounts, injurious and pernicious to them; not only to the ligneous, herbaceous, and flowery parts above, but alſo to the roots and fibres below the earth: for as the air penetrates deep into the ſoil, it is natural to conclude, that a dry, huſky, ſcorching air, may be very prejudicial to the tender fibres of new planted vegetables.

ALDER-TREE, the name of a tree very common in moſt parts of England. It hath male and female flowers, which are produced at remote diſtances on the ſame plant; the male flowers are digeſted into a long juli or catkin, which is looſe, imbricated, and cylindrical. The female flowers are collected into a conical ſcaly head, and are ſucceeded by ſcaly cones.

Theſe trees delight in a moiſt ſoil, where few other trees will thrive, and are are a great improvement to ſuch lands; they are propagated either by layers, or planting of truncheons about three feet in length. The beſt time for this is in February, or the beginning of March; theſe ſhould be ſharpened at one end, and the ground looſened with an inſtrument before they are thruſt into it; leſt, by the ſtiffneſs of the ſoil, the bark ſhould be torn off, which may occaſion their miſcarriage. Theſe truncheons ſhould be thruſt into the earth two feet at leaſt, to prevent their being blown out of the ground by ſtrong winds, after they have made ſtout ſhoots. The plantations ſhould be cleared from all ſuch weeds as grow tall, otherwiſe they will overbear the young ſhoots; but when they have made good heads, they will keep down the weeds, and will require no farther care.

If you raiſe them by laying down the branches, it muſt be performed in October; and by the October following, they will have taken root ſufficient to be tranſplanted out; which muſt be done by digging a hole, and looſening the earth in the place where each plant is to ſtand, planting the young trees at leaſt a foot and a half deep, cutting off the top to about nine inches above the ſurface, which will occaſion them to ſhoot out many branches.

The diſtance theſe trees ſhould be placed, if deſigned for a coppice, is ſix feet ſquare; and if the ſmall lateral ſhoots are taken off in the ſpring, it will very much ſtrengthen your upright poles, provided you leave a few ſmall ſhoots at diſtances upon the body thereof, to detain the ſap for the encreaſe of its bulk.

Theſe trees may be alſo planted by the ſide of brooks, as is uſual for willows, where they will thrive exceedingly, and may be cut for poles every fifth or ſixth year. This wood is in great requeſt with the turners, and will endure a long time under ground, or to be laid in water. *Miller's Gard. Dict.*

Alder makes an extraordinary fence againſt rivers and ſtreams, and preſerves the banks from being undermined by the water; becauſe it is always ſending ſuckers from the loweſt roots, which makes it very uſeful, where ſtreams wear away the banks, and are widening of their courſe. *Mortimer's Huſbandry.*

Alder has one peculiar and beneficial property, namely, that no beaſt will crop it, be it young or old, which ſaves the great charge of fencing it after planting. *Ellis's Timber Tree improved.*

ALE, a fermented liquor obtained from the infuſion of malt, and differing only from beer in having a leſs proportion of malt and hops. *See the articles* BEER *and* BREWING.

GILL-ALE, is ale in which the dried leaves of gill, or ground-ivy, have been infuſed. It is eſteemed good in diſorders of the breaſt, and obſtructions of the viſceræ.

ALLEY, in the new huſbandry, implies the vacant ſpace between the outermoſt row of corn on one bed, and the neareſt row to it on the next paralled bed. *See* BED.

The practice of the new huſbandry has already ſufficiently ſhewn, that too narrow alleys would hardly anſwer any of the ends for which they are intended; and, on the other hand, the making them too wide is a loſs of ground. About four feet, excluſive of the ſpaces or partitions between the rows of corn in the beds, is a good middling breadth.

It is not indeed neceſſary to make the alleys quite ſo wide in good ſoils; an intelligent huſbandman will eaſily judge what breadth is moſt proper. But what greatly merits the attention of every one, and ought never to be loſt ſight of, is, that wide alleys are more eaſily and

much better ſtirred than thoſe which are narrower: for when an alley is wide, the large furrow in the middle of it may be cut deep, there being then ſufficient room to turn the earth over towards the rows; while, on the other hand, the earth, in too narrow alleys, cannot be ſtirred deep enough, nor can room be found for what is turned over out of the furrows, without danger of burying great part of the rows.

We will, therefore, ſuppoſe the general breadth of the alleys to be about four feet; but the whole of that breadth is not to be ploughed or ſtirred, either with the plough or cultivator, as ſoon as the field is ſown. Neither of theſe inſtruments ought to go too near the rows of corn, for fear of rooting up the plants; but a ſlip of earth about ſix inches wide, ſhould be left untouched on the outſide of each bed; by which means the part of the alley that is to be ſtirred, will be reduced to the breadth of three feet; and even that is leſſened in the firſt ploughing before winter by a deep furrow, which is then cut cloſe to, and all along thoſe ſix inch ſlips, and the earth taken out of each furrow, is thrown into the great furrow in the middle of the alley, which it ſerves to fill and arch up. Theſe two ſide furrows make together a breadth of about eighteen inches, and, conſequently leave, in the middle of the alley, a breadth of about eighteen inches more, on which is heaped up the earth thrown out of the two furrows: and thus the alleys remain all the winter.

The firſt hoeing in the ſpring ſhould turn the earth, heaped up in the middle of the alleys, back towards the rows of corn. The two furrows that were opened before winter are then filled up, and a new one is cut in the middle of the alley.

To perform the firſt hoeing with the common plough, which may be very eaſily done, two turns of that inſtrument will be requiſite, namely, one on each ſide of the alley, as near as poſſible to the beds. But as theſe two turns will not be always ſufficient to form the furrow perfectly, a great deal of earth frequently remaining between it and the bed, a third turn of the plough becomes often neceſſary; and ſometimes a fourth, to hollow the middle furrow as it ought to be.

If this work be performed with the cultivator with two mould-boards, the inſtrument muſt be placed in the middle of the alley and the horſes in one of the two furrows. The ſhare will eaſily enter a great depth into the earth, which was laid there by the laſt hoeing before winter: and as the horſes advance, that great ridge of earth will be divided into two parts, which will be turned over into, and fill up the furrows that were made before winter, on each ſide of the alley, cloſe to the beds. *See the article* CULTIVATOR.

Thus the great furrow in the middle of the alley will be opened, and the whole operation performed by one turn of the cultivator. The earth thus turned over will be thoroughly ſtirred, and ſo much time and labour will be ſaved by this method, that the farmer may eaſily afford one or two ſtirrings more in the ſummer, which will always be of great ſervice. *M. de Chateauvieux.*

Wheat, in the new huſbandry, is uſually cultivated upon ridges of about four feet nine inches broad, and upon theſe ridges are drilled two rows of wheat, ten inches aſunder, the diſtance therefore between theſe double rows is near four feet; this diſtance, which M. de Chateauvieux here calls the alleys, was, by Mr. Tull, called the intervals, and the diſtances of the two rows of wheat upon the ridges he called partitions.

He at firſt made his ridges ſix feet broad, and drilled three or four rows upon each ridge; but upon further experience he found, that two rows upon a ridge of four feet nine inches broad, produced better crops than three or four rows upon ſix feet ridges, and he recommends theſe double rows to thoſe who would cultivate wheat with the hoe plough.

It is likewiſe obſervable, that though in his early practiſe of horſe-hoeing wheat, he was cautious of bringing the hoe-plough very near the rows, he found afterwards that there was no danger in hoeing cloſe on the rows of corn, but, on the contrary, the crop was much improved by it, and that the plough in hoeing the earth from the rows, could not be brought too cloſe to them, unleſs it tore out any of the plants, inſomuch, that he ſays he could bring the plough within about an inch of the rows when the earth was in right temper for it.

The reaſon that M. de Chateauvieux directs, as above, that the hoe plough ſhould not come cloſe to the rows by ſix inches, was becauſe he had not then ſeen Mr. Tulls laſt Improvements upon the Hoeing Culture, which was not publiſhed till ſeveral years after the firſt parts of the horſe-hoeing huſbandry was tranſlated into French.

The firſt horſe-hoeing of the wheat is performed in the beginning of winter, and the earth is ploughed away from the rows into the intervals, which forms ſmall ridges in the middle between the double rows. The ſecond hoeing is in the ſpring, which turns the back to the rows. The third hoeing is from the rows after the wheat has bloſſomed; this turns the earth into the intervals, forming ſmall ridges there as at the firſt hoeing. The fourth hoeing returns the earth to the ridges, which is performed a month or more after the third hoeing: this commonly finiſhes the horſe hoeings if the land is in good heart, otherwiſe one or two more hoeings are neceſſary. The double mould board plough is uſeful to clear the furrows, and lay all the earth up in ridges after the laſt hoeing, but no cultivators ſhould be ſubſtituted in room of the hoe-plough.

ALLEY, in gardening, implies a ſtrait walk, bounded on both ſides with trees or ſhrubs, and commonly covered with gravel or graſs.

An alley is diſtinguiſhed from a path, by being broad enough for two perſons to walk a-breaſt, whereas a path is ſuppoſed to admit of only one at a time; but if an alley be wider than ten or twelve feet, it may, with more propriety, be called a walk.

Covered ALLEY, is that where the trees on each ſide meet at the top, ſo as to form a ſhade.

ALMOND-TREE, is generally cultivated in gardens for the beauty of its flowers. Theſe often appear in February, when the ſpring is forward; but if froſt comes on after the flowers appear, their beauty will be of ſhort duration, and in thoſe ſeaſons few almonds are produced; whereas when the trees do not flower till late in March, they ſeldom fail to bear plenty of fruit; many of which will be very ſweet, and fit for the table when green, but they will not keep long.

Almond trees are propagated by inoculating a bud of theſe trees into a plum, almond, or peach ſtock, in the month of July. The next ſpring, when the buds ſhoot,

you

you may train them up, either for ſtandards, or ſuffer them to grow for half ſtandards, according to your own fancy.

The beſt ſeaſon for tranſplanting theſe trees, if for dry ground, is in October, as ſoon as the leaves begin to decay; but for a wet ſoil, February is much preferable: obſerve always to bud upon plum-ſtocks for wet grounds, and on almond or peach-ſtocks for dry. *Miller's Gard. Dict.*

ALP, a name in many counties of England for the bulfinch.

AMEL-CORN, the ſame with Spelt. *See* SPELT.

AMBERVALIA, a ceremony practiſed by the ancient Romans, in order to procure from the gods a happy harveſt.

This ceremony conſiſted of a proceſſion in which the victims were conducted thrice round the corn fields before they were ſacrificed. Twelve prieſts walked at the head of the proceſſion, which conſiſted of all the neighbouring inhabitants, every one being crowned with leaves of oak, and ſinging hymns in honour of Ceres, the goddeſs of corn.

AMBLE, a peculiar kind of pace, wherein a horſe's two legs of the ſame ſide move at the ſame time.

In this pace the horſe's legs move nearer the ground than in the walk, and, at the ſame time, are more extended: but what is moſt ſingular in it is, that the two legs of the ſame ſide, for inſtance, the off hind and fore-leg, move at the ſame time; and then the two near legs, in making another ſtep, move at once; the motion being performed in this alternate manner. So that the two ſides are alternately without ſupport, or any equilibrium between the one and the other, which muſt neceſſarily prove very fatiguing to the horſe, being obliged to ſupport himſelf in a forced oſcillation, by the rapidity of a motion, in which his feet are ſcarcely off the ground. For if in the amble he lifted his feet as in the trot, or even in a walk, the oſcillation would be ſuch, that he could not avoid falling on his ſide, and it is only by keeping his feet very near the ground, and by the quick alternate motion that he ſupports himſelf in this pace, in which the hind leg is not only to move at the ſame time with the fore-leg of the ſame ſide, but alſo to gain on it, or touch the ground a foot, or a foot and a half, beyond the ſpot where the latter grounded. The further the hind-leg extends beyond the place where the fore-leg grounded, the better the horſe ambles, and the whole motion is proportionally faſter. Thus the whole difference between the amble and the trot conſiſts in this, that the two legs moving together in the latter are in a diagonal poſition, whereas, in the former, the two legs of the ſame ſide move together.

This pace, which is very fatiguing to the horſe, is very eaſy to the rider. It has not the roughneſs of the trot, which is cauſed by the reſiſtance of the fore-leg, at the lifting up of the hind; becauſe, in the amble, this fore-leg is lifted up at the ſame time with the hind-leg of the ſame ſide; whereas, in the trot, the fore-leg of the ſame ſide is at reſt, and reſiſts the impulſe during the whole time that the hind leg is in motion.

They who are ſkilled in horſemanſhip tell us, that horſes which naturally amble, never trot, and that they are a great deal weaker than others. Colts, indeed, very often move in this manner, eſpecially when they exert themſelves, and are not ſtrong enough to trot or gallop. Moſt good horſes, which have been over-worked, and on the decline, are alſo obſerved voluntarily to amble, when forced to a motion ſwifter than a walk.

The amble may, therefore, be conſidered as a defective pace, not being common, and natural only to a very few horſes, which, in general, are weaker than others. Add to this, that ſuch amblers as ſeem the ſtrongeſt, are ſpoiled ſooner than thoſe which trot or gallop. *Buffon's Hiſtoire Naturel, tom.* IV.

There are various methods of diſcipline for bringing a young horſe to amble: ſome chuſe to toil him in his foot pace through new ploughed fields, which naturally inures him to the ſtroke required in the amble; but this diſorderly toil is very apt to weaken, and ſometimes to lame a young horſe. Others attempt it by ſtopping him in a gallop, or trot; ſo that by loſing both, he neceſſarily ſtumbles on an amble; but this is apt to ſpoil a good mouth and rein, and expoſes the horſe to the danger of an hoof reach, or ſinew ſtrain, by over-reaching, &c.—Some prefer ambling by weights as the beſt way, and in order to do this, either overload the horſe with exceſſive heavy ſhoes, or fold thick pieces of lead about the fetlock paſterns, without conſidering that the former are apt to make him interfere, or ſtrike ſhort with his hind-feet;—and that the latter, beſides that miſchief, expoſe the horſe to incurable ſtrains, cruſhing of the coronet, breeding of ring-bones, &c. Others load the horſe with earth, lead, &c. which often occaſion a ſwaying of the back, overſtraining of the fillets, &c. Some endeavour to make him amble in hand, before they mount his back, by means of ſome wall, ſmooth pale, or rail, and by checking him in the mouth with the bridle-hand, and correcting him with a rod on the hinder hoofs, and under the belly, when he treads falſe; but this is very apt to ſpoil a ſpirited horſe, even before he can underſtand what you would have him do.

The beſt method ſeems to conſiſt in trying with your hands, by a gentle and deliberate racking and thruſting of the horſe forwards, by helping him in the weak part of his mouth with your ſnaffle, which muſt be ſmooth, big, and full; and correcting him firſt on one ſide, then on the other, with the calves of your legs, and ſometimes with a ſpur. If you can by this means make him fall readily into an amble, though in a ſhuffling and diſorderly manner, much labour will be ſaved; for that aptneſs to amble will render the tramel more eaſy to him, and he will find the motion without ſtumbling, or being frighted. *See the article* TRAMEL. *Bradley's Dict. Ruſt.*

AMBRY, ACEMBRY, or ACMERY, a pantry or cupboard to ſet victuals in.

ANBURY, a kind of wen, or ſpongy wart growing on any part of a horſe's body. *See the article* WEN.

ANGORA *goat*. *See the article* GOAT.

ANJOU *cabbage-ſhrub*, an excellent vegetable both for the kitchen and the food of cattle, cultivated with great ſucceſs in ſeveral provinces of France; and that ingenious huſbandman, the marquis of Turbilly, lately ſent a parcel of the ſeeds to our ſociety for the encouragement of arts, who very readily diſtributed them to ſuch gentlemen as applied to them for that purpoſe, in order to their being cultivated here; ſo that there is reaſon to hope, that this uſeful plant will ſoon become common in England. The following inſtructions are given by the marquis de Turbilly, for cultivating the Anjou cabbage.

" The great Anjou cabbage is one of the moſt uſeful leguminous plants for country people. It will grow in almoſt any ſoil, not excepting even the moſt indifferent, provided it be ſufficiently dunged. It is but little known about Paris, and in many other places, where it might be cultivated to great advantage.

" The ſeeds of this cabbage are commonly ſown in June, in a quarter of good mould, in the kitchen garden, and watered from time to time in caſe of drought. The plants will riſe pretty ſpeedily, and ſhould be thinned ſoon after, wherever they ſtand too thick. The next care is to keep them free from weeds whilſt they continue, by hoeing the ground between them. About the firſt of November, they ſhould be tranſplanted into the field where they are to remain. They ſhould be planted there in trenches dug with a ſpade, pretty deep, that is, they ſhould be buried almoſt up to the leaves. The diſtance between them ſhould be two feet, or two feet and a half every way, according to the goodneſs of the ſoil. Particular care ſhould be taken never to plant them with a dibble, as gardeners plant other ſorts of cabbages. A layer of dung ſhould be ſpread along the bottom of the trench, and the roots of the tranſplanted cabbages covered therewith. The mould taken out ſhould then be returned back upon the dung; and as the trench will then no longer hold it all, there will remain a ridge between each row of cabbages.

" Towards the middle of May enſuing, the ground ſhould be well ſtirred between the plants, with a ſpade, or ſome other proper inſtrument, and its whole ſurface laid quite level. After this nothing more remains to be done, except pulling up the weeds, from time to time, as they appear.

" Many huſbandmen ſow the ſeeds of theſe cabbages with thoſe of hemp; and though this may not be ſo ſure as the former, it often ſucceeds very well, eſpecially in wet years. When the hemp is pulled up, a multitude of little cabbages are ſeen, and which having then a free air, grow apace. They are tranſplanted about the firſt of November in the manner before directed, and are preferred to thoſe of the kitchen garden, becauſe they are not ſo apt to run up to ſeed the next ſpring; an accident which ſometimes happens to a few of theſe cabbages, in certain years; and it then becomes neceſſary to replace them by others which have not run up, and which are reſerved for this purpoſe in a ſeparate ſpot of ground.

" Several farmers uſe a plough to cut the trench for tranſplanting theſe cab ages; but then they do not remove them till the ſpring, leaving them, in the mean time, in the place where they were ſown. They afterwards give the earth a ſtirring with the ſpade, and lay it ſmooth towards the end of May, in the manner before directed. Whole fields of theſe cabbages may be ſeen on many farms in Anjou and Poitou, and which prove a very uſeful reſource.

" In the month of June, ſuch of theſe cabbages as are already large, and do not turn in their leaves for cabbaging, but ſtill continue green, begin to be fit for uſe, and ſoon arrive at their full perfection, which they retain till the next ſpring, when they begin to run up, and afterwards bloſſom. Their ſeeds ripen towards the end of July, and what is intended for ſowing ſhould then be gathered.

" In Anjou, when theſe cabbages are entirely run up, they generally grow to the height of ſeven or eight feet: ſometimes they reach to eight feet and a half, or nine feet; nay, ſome have even been ſeen of a greater height.

" From the month of June, when theſe cabbages begin to be fit for uſe, their leaves are gathered from time to time, and they ſhoot out again. They are large, excellent food, and ſo tender that they are dreſſed with a moment's boiling. They never occaſion any flatulencies or uneaſineſs in the ſtomach; and are alſo very good food for cattle, which eat them greedily. They likewiſe greatly increaſe the milk of cows.

" Such are the properties of this kind of cabbage, greatly eſteemed in Anjou, Poitou, Brittany, Le Maine, and ſome other neighbouring provinces. In Anjou farmers are bound by their leaſes to plant yearly a certain number of theſe cabbages, and to leave a certain number of them ſtanding when they quit their farms.

" This cabbage forms a kind of ſhrub, the great utility of which may be gathered from this, that its leaves afford nouriſhment to men and cattle; and its ſtalk, which is about the thickneſs of one's wriſt, is uſed, when dry, for fuel.

" It ſometimes happens in extremely ſevere winters, that ſome of theſe cabbages are frozen; and this, in the above provinces, is conſidered as a very great loſs; but that accident is rare, becauſe this kind of cabbage reſiſts froſts better than moſt others.

" The ground where theſe cabbages are planted ſhould be fenced in very carefully by hedges or ditches, to preſerve it from the depredations of cattle, which are extremely fond of them. With this precaution I have made ſeveral plantations of them, near the houſes erected in the midſt of the heaths and commons I have broken up and improved; and they have ſucceeded very well, though the ſoil is but indifferent in many places.

" I have, near my houſe in Anjou, two well encloſed fields, deſtined for this ſort of plantation. They are planted alternately every year with young cabbages. When theſe are pulled up, after they have ſeeded in the ſecond year, at the time already mentioned, the ground where they ſtood is dug up, and ſowed with peaſe or beans, the crop of which being taken off before the firſt of November, makes room for planting new cabbages at the proper ſeaſon. The ſoil is looſened and enriched by the peaſe and beans, and by this means the land is never reſted; nor is it ever exhauſted, becauſe it is dunged whenever the cabbages are planted.

" Theſe cabbages are of ſuch excellent ſervice to me, that I have often wondered at their not being cultivated in all the different countries of Europe. I believe they would ſucceed every where, and I adviſe all huſbandmen to make plantations of them.

" I wiſh that this ſhort memoir, founded on my own experience, may contribute to extend the culture of this uſeful plant."

ANNUAL *plants*, ſuch as continue one year only: or ſuch as ſpring up, ripen their ſeed, and periſh in that ſpace of time. Thus wheat, barley, oats, beans, peaſe, &c. are annual plants.

ANNUAL *meadow-graſs*, called in ſome parts of England, Suffolk-graſs, a ſpecies of very beautiful graſs, making the fineſt turfs, and ſeems particularly well adapted to dairy farms. *See* Plate I. Fig. 1. *which repreſents this graſs in its perfection.*

" I have, ſays Mr. Stillingfleet, ſeen whole fields of it in High-Suffolk, without any mixture of other graſſes,

and as ſome of the beſt ſalt butter we have in London comes from that country, it is moſt likely to be the beſt graſs for the dairy." He adds, that he obſerved, upon Malvern-hill, a walk made there for the convenience of the water drinkers, which was, in many places, covered over with this graſs in leſs than a year, though he could not find a ſingle plant of it beſides in any other part of the hill. This was doubtleſs owing to the frequent treading which has the greateſt tendency to make this graſs flouriſh; and therefore it is very evident, that rolling muſt be very ſerviceable to it. As the flowers and ſtems of this plant do not grow brown ſo ſoon as thoſe of other graſſes, nor cover the radical leaves ſo much, becauſe they are conſiderably ſhorter, this affords a more pleaſing turf than any other graſs." *Stillingfleet's Miſcel. Tracts.*

Mr. Ray obſerves of the common meadow graſs, that it is a ſlender and ſucculent plant, very agreeable to cattle, and a fattener of them; that it delights in a rich ſoil; and that it is not injured by being trodden under foot, and therefore is commonly found along the ſides of paths and roads. It ſpindles and ears in the ſpring, and continues to ſhoot during the whole ſummer. *Ray's Hiſtory of Plants.*

As plenty of the ſeeds of this graſs might be very eaſily procured from Suffolk, it might be propagated and cultivated in all parts of England, where the ſoil and ſituation are adapted to its growth.

It is indeed amazing, that amidſt the great variety of graſſes that grow naturally in England, that ſo few farmers have had any thoughts about improving their meadows and paſtures; they ſeem to take every thing upon truſt, imagining, perhaps, that the graſs they find growing naturally in their grounds, is much better, and more adapted to the nature of the ſoil, than any other they could ſow, or adopt in its ſtead.

But this is ſurely a very narrow way of thinking, and ſhould it be encouraged, would ſoon put a ſtop to all improvements in huſbandry. We have been too long influenced by cuſtom: it is time for us to ſhake off our fetters, and rouze ourſelves from the deep lethargy which has prevented us from perceiving, or at leaſt from removing the diſadvantages of the old huſbandry, which in many reſpects is highly diſadvantageous both to the farmer and his country.

ANTICOR, a diſeaſe among horſes, conſiſting of a malignant ſwelling in the breaſt; which extends ſometimes to the very ſheath under the belly; and is attended with a fever, great depreſſion and weakneſs, and a total want of appetite.

The cure ſhould be firſt attempted by large and repeated bleedings, to abate the inflammation; emollient clyſters ſhould be injected twice or thrice a day, with an ounce of ſal prunella in each. The ſwelling ſhould be bathed with marſhmallow ointment, and an opening poultice, with onions boiled in it, ſhould be daily applied over it. If by this method continued four or five days, the inflammation in the throat and gullet be removed, the attention ſhould more particularly turn to encourage the ſwelling on the breaſt, and bring it, if poſſible, to matter: let the poultice therefore be continued, and give the horſe two ounces of Venice treacle, diſſolved in a pint of beer, every night. When the ſwelling is grown ſoft, it muſt be opened with a knife, and dreſſed with turpentine digeſtive, the danger being then over.

But ſhould it be found impracticable to bring the ſwelling to matter, and the ſwelling upwards ſhould increaſe ſo as to endanger ſuffocation, authors have adviſed to pierce the humour with a hot pointed cautery, and dreſs part with the turpentine digeſtive, ſharpened with a ſmall quantity of Spaniſh flies and uphorbium in powder, in order to ſtimulate and promote a greater diſcharge; at the ſame time fomenting and bathing the adjacent parts with ointment of marſhmallows.

M. Gueriniere, as well as Soleyſel, have adviſed opening the ſkin, when the tumour cannot be brought to matter, in order to introduce a piece of black hellebore-root ſteeped in vinegar, and to confine it there for twenty-four hours; this alſo is intended as a ſtimulent, and is ſaid to anſwer the intention, by occaſioning ſometimes a ſwelling as big as a man's head. *Bartlet's Farriery.*

ANTS, or *piſmires*, are injurious both to paſture lands and gardens; in the former by throwing up hills, and in the latter, by feeding on the fruit, &c.

The method of keeping them from trees is by encompaſſing the ſtem with a circle or roll of wool, newly plucked from the ſheep's belly, four fingers in breadth, or by laying ſaw-duſt round the tree. The ſame will be effected when you anoint the tree with tar; but as tar is prejudicial to trees, human ordure, will, perhaps, do better; becauſe if any of it be put into their hills, it will kill them. *Mortimer's Huſbandry.*

ANT-*hills*, the habitations of the ants, conſiſting of little eminences, compoſed of ſmall particles of ſand, lightly and artfully laid together.

Theſe hills, or habitations of the ants, though very convenient for themſelves and their own ſocieties, are very deſtructive to the farmer, depriving him of as much land as theſe hills cover; which may be often computed at a tenth part, or more, of his valuable graſs lands. Nay, in ſome places, where negligence has ſuffered them to multiply, almoſt half of it has been rendered uſeleſs: the hills ſtanding as thick together as graſs-cocks in hay time: and what is moſt ſurpriſing, this indolence is defended by affirming, that the area or ſuperficies of their land is thereby encreaſed: whereas it is well known, by the induſtrious, that very little or no graſs ever grows thereon; and therefore, if the ſurface be encreaſed, the produce is proportionably decreaſed. *See the article* MOLE-HILL.

It has been a cuſtom in many places at the beginning of winter, and often when the weather was not very cold, to dig up the ant-hills, three or four inches below the ſurface of the ground; and then to cut them in pieces, and ſcatter the fragments about: but this only diſſeminates the inſects inſtead of deſtroying them; they can hide themſelves among the roots of the graſs for the preſent; and then collect themſelves together again upon any little eminence, of which there are great numbers ready for their purpoſe, viz. the circular ridges round the hollows, where the hills ſtood, as is very ſoon viſible to a curious obſerver. A much better method ſeems therefore to be pointed out by a writer in the *Muſeum Ruſticum*, vol. vi. namely, to cut off the hills entire, and even with the ſurface; and to let them lie whole at a little diſtance, with their bottom upwards: by this means the ants, which are known to be very tenaceous of their neſts, will continue in their habitations, while the rains, by running into their holes of communication, aſſiſted afterwards by the froſts, which will now ſooner penetrate to their dwellings, will

deſtroy

deſtroy them. Perhaps a little ſoot ſown on the places, and waſhed in with the rains, would have a better effect. The hills when rendered mellow by the froſts, may be broken and diſperſed about the land. This method of cutting the hills even with the ſurface, has one advantage; it leaves the paſture-land even and fit for mowing; and at the ſame time the little eminences being taken away, the inſects are expoſed to the wet, which is diſagreeable to them.

In wet weather theſe inſects accumulate cavernous heaps of ſandy particles among the graſs, called by the labourers 'prout-hills; which quickly take off the edge of a ſcythe. Theſe hills, which are very light and compreſſible, the above writer aſſures us from experience, may be readily ſtamped down, by the feet of the hay-makers, and the inſects, together with their eggs and earth, eaſily pounded to a mortar. This ſhould be repeated a ſecond, and perhaps a third time, after the itinerant foragers have returned from their queſt of food, and have begun to raiſe new ſtructures near the old demoliſhed habitations.

APHERNOUSLI, or *arkenouſli*, a ſpecies of pine, or pinaſter, growing wild on the Alps, where one would think it impoſſible that any tree could vegetate and proſper; and therefore would probably thrive to great advantage on our bleak, barren, rocky, mountainous tracts of land. See Plate I. Fig. 2.

The timber is large, and has many uſes, eſpecially within-doors, or under cover. The branches reſemble thoſe of the pitch-trees, commonly called the ſpruce fir: but the cones are more round in the middle, being of a purpliſh colour, ſhaded with black. The bark of the trunk, or bole of the tree, is not reddiſh like the bark of the pine, but of a whitiſh caſt, like that of the fir. The huſk, or ſort of ſhell, which incloſes the kernels, is eaſily cracked, and the kernels are covered with a brown ſkin, which peels off; they are about as large as a common pea, triangular like buck-wheat, and white and ſoft as a blanched almond, of an oily agreeable taſte, but leaving in the mouth that ſmall degree of aſperity, which is peculiar to wild fruits, and is not unpleaſing. Theſe kernels make a part ſometimes in a Swiſs deſert; they ſupply the place of muſhroom-buttons in ragouts; and are alſo recommended in conſumptive caſes, on account of their balſamic oil.

Wainſcoting, flooring, and other joiner's work, made with the planks of aphernouſli, are of a finer grain, and more beautifully variegated than deal, and the ſmell of the wood is more agreeable. From this tree is extracted a white odoriferous reſin.

The aphernouſli is of a healthy, vigorous nature, and will bear removing when it is young, even in dry warm weather. The wood makes excellent firing in ſtoves, ovens, and kilns; but is dangerous to be uſed on the hearth or in grates, being apt to ſplinter and fly to a conſiderable diſtance.

This tree is the *pinus cembra* of Matthioli and Linnæus, the *pinus foliis quinis* in Haller, *the larix ſemper-virens* in the German Ephemeris, the *libanus carpathius* of ſome writers, and the *pina cinque feüeilles*, N° 20. in Du Hamel. It grows in great abundance on the moſt mountainous and coldeſt parts of the Briançonnois, where it is called by the natives *alviez*. It bears ſome reſemblance to the white Canada pine, which is better known in England by the name of Weymouth-pine. *Eſſays on Huſbandry.*

APIARY, a bee-garden, or place where bees are kept. See the article BEES.

APOPLEXY, or, as the farriers generallycall it, the *ſtaggers*, a diſeaſe to which the horſe is ſubject, and by which the creature drops down ſuddenly without ſenſe or motion, except a working of his flanks, proceeding from the motion of the heart and lungs, which never ceaſes while any ſpark of life remains.

The previous ſymptoms are drowſineſs, watry moiſt eyes, ſomewhat full and inflamed, a diſpoſition to reel, feebleneſs, a bad appetite, and almoſt continual hanging of the head, or reſting it in his manger, ſometimes with little or no fever, and ſcarce any alteration in the dung or urine. When the apoplexy proceeds from water collected in the ſinuſes and ventricles of the brain, the horſe has generally, beſides all the foregoing ſymptoms, a diſpoſition to rear up, and is apt to fall back, when any one goes to handle him about his head. The reaſon of his falling backwards ſeems to be obvious, becauſe when the head is raiſed with his mouth upwards, the water in the ventricles cauſes a weight upon the cerebellum, or part lying under the brain, and origin of the nerves, ſo as to deprive the creature of ſenſe and motion at once: this does not, however, prove ſuddenly mortal. Young horſes are moſt ſubject to it, and, with proper helps, and good uſage, ſometimes get over it: but when the apoplexy proceeds from wounds or blows on the head, or from any other cauſe producing ruptures in the blood-veſſels, or from matter collected in the brain, or its membranes; or if any part of the brain or its membranes be indurated, or grown callous, by long continuance, the horſe will not only have moſt of the ſymptoms already deſcribed, but will be frantic by fits, eſpecially after his feeds, ſo as to ſtart and fly into motion at every thing that comes near him. Theſe caſes are extremely dangerous, and ſeldom admit of a perfect recovery. But when horſes fall down ſuddenly and work violently at their flanks, without any ability to riſe, even after plentiful bleeding, ſuch horſes ſeldom recover.

All that can be done in ſuch caſes is to ſtrike the veins in ſeveral parts at once, to raiſe up the horſe's head and ſhoulders, propping them with plenty of ſtraw; and if he ſurvive the fit, to cut ſeveral rowels; though in caſe of ruptured veſſels, or if any kind of extraneous matter be lodged on the brain, or its membranes, all theſe helps will be of little ſervice.

But if the apoplectic fits happens to be only the effect of a plethora, or fulneſs of blood, from high feeding, and want of ſufficient exerciſe; or if it be the effect of a ſizy blood, which is often the caſe of many young horſes, that have been fed for ſale, or from catching cold while the blood is in this ſtate, the cure will not be attended with any great difficulty, notwithſtanding a horſe, in theſe circumſtances, may reel and ſtagger, and ſometimes fall down ſuddenly.

Firſt of all bleed plentifully, and keep the horſe for ſome time to an opening diet of ſcalded bran, and ſometimes ſcalded barley, leſſening the quantity of his hay. After two days repeat the bleeding, but in a ſmaller degree. If the horſe has a cold, it will be proper to give him pectoral drinks, proper for that diſorder. See COLD.

But if no ſymptom of a cold appear it will be neceſſary, after bleeding and a ſpare diet, to give him two or three purges, not only to remove the plethora or fulneſs, but attenuate and thin his blood, for which the following is recommended.

" Take

Annual Meadow Grass.

Fig.1.

A Branch of the Aphernousli...

Fig.2.

Fig.3.

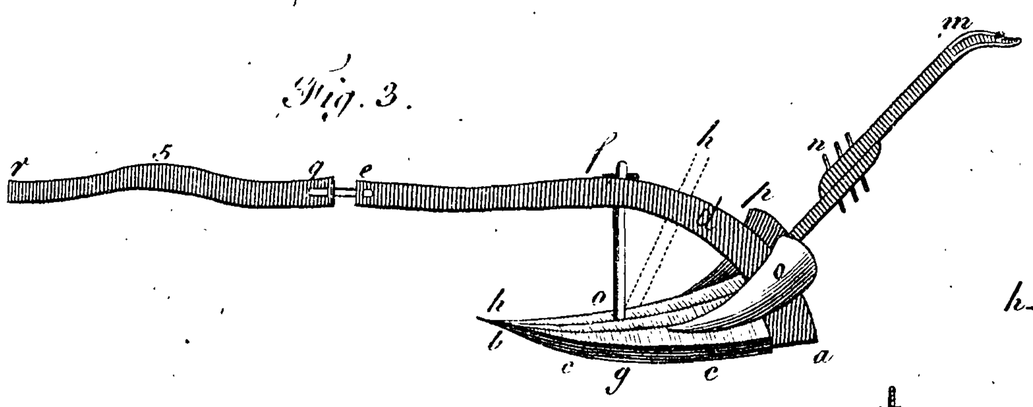
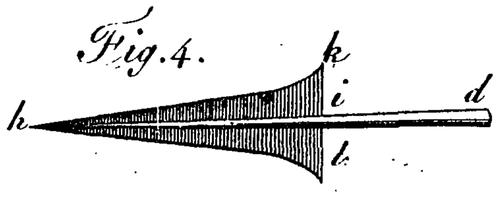
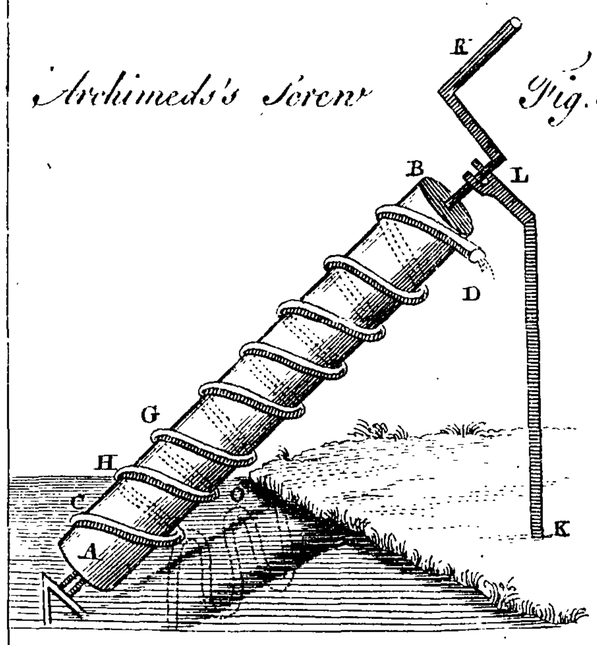


Fig.4.



Archimeds's Screw

Fig.5.



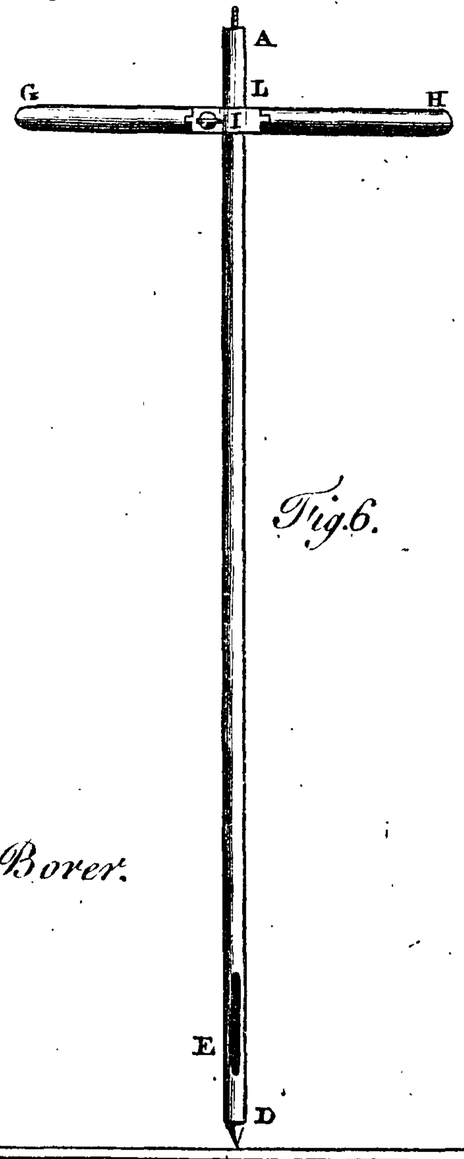


Fig.6.

Borer.



Fig.7.

Fig.8.

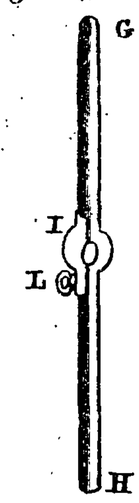


Fig.9.



I. Hulett Sculp.

"Take of the fineſt ſuccotrine aloes, an ounce and a quarter; freſh jallap, two drams; ſalt of tartar, three drams; native cinnabar, or the cinnabar of antimony half an ounce; make it into a ball with a ſufficient quantity of ſyrup of roſes or marſhmallows; adding twenty or thirty drops of chemical oil of anniſeeds, making the whole into a ball, rolling it in liquorice-powder."

The purge may be made ſtronger or weaker by increaſing or diminiſhing the jallap. Let this be repeated two or three times, and the horſe will probably recover, without a relapſe. Powder of antimony, or its preparations, as the liver, the *crocus metallorum*, its cinnabar, or the native cinnabar, mixed with equal parts of gum guiacum, may be alſo given in ounce doſes, for three or four weeks, to mend his blood, and take off its ſizineſs. Nor ſhould exerciſe, as ſoon as the horſe is able to bear it, be omitted.

When a horſe drops down ſuddenly with hard riding, or violent driving, it in many reſpects reſembles an apoplexy, and all the organs of the head are affected as in an apoplexy; but as this proceeds only from the extraordinary rarefaction of the blood, and its rapid motion, whereby the ſmall veſſels of the brain, heart, and lungs, are ſo extremely diſtended as to cauſe an univerſal preſſure on the origin of the nerves; the horſe by this means loſes all ſenſe and motion, and generally falls ſuddenly, eſpecially upon any ſudden ſtop; becauſe when the bodily motion ceaſes, the circulation of the blood in the veins is not accelerated in proportion to its influx from the arteries, which ſoon produces a ſuffocation and a falling down, without ſenſe or motion. Inſtances of this kind are not uncommon, eſpecially in very hot weather, when the external heat adds greatly to the blood's motion and rarefaction. But as we ſuppoſe in this caſe, little or no fault in the blood, except, perhaps, a plethora, or weakneſs of the veſſels, the quickeſt and readieſt remedy is bleeding; and unleſs the horſe dies with the violence of the fall, which ſometimes happens, or by burſting the ſmall veſſels of the brain or lungs, or happens through polipuſes in the heart or principal veins, he will ſoon riſe of himſelf, or without much help, and may be preſerved from ſuch accidents for the future, by better uſage. *Gibſon on the Diſeaſes of Horſes.*

APPETITE, a certain painful or uneaſy ſenſation, always accompanied with a deſire to eat or drink.

Horſes, more than moſt other creatures, are ſubject to diſeaſes of the ſtomach, particularly to *a want of appetite*, and a *vitiated*, or *voracious appetite*.

Want of APPETITE is when a horſe feeds poorly, and is apt to mangle his hay, or leave it in the rack, and the ſame time gathers little fleſh, and his dung habitually ſoft, and of a pale colour.

Theſe are evident ſigns of a relaxed conſtitution, wherein the weakneſs of the ſtomach and guts may have a very great ſhare. This habitual weakneſs may be either natural and hereditary, or may be cauſed by ſome previous ill management; ſuch as too much ſcalded bran, or too much hot meat of any kind, which relaxes the tone of the ſtomach or guts, and in the end produces a weak digeſtion, and conſequently a loſs of appetite.

The beſt method to harden and recover ſuch horſes, is to give them gentle exerciſe in the open air, eſpecially in dry weather; never to load their ſtomachs with large feeds, and to keep them as much as poſſible to a dry diet, indulging them now and then with a handful of beans among their oats; but in caſe the horſe grows weak, and requires the help of phyſic, a few laxative purges like the following, ſhould be given.

"Take ſuccotrine aloes, ſix drams; rhubarb in fine powder, two drams; ſaffron dried and powdered, one dram: make it into a ſtiff ball, with a ſufficient quantity of ſyrup of roſes, and add two drams of the elixir proprietatis, prepared with oil of ſulphur by the bell."

This purge will work very gently, and bring the horſe to a better appetite, and ſtrengthen his digeſtion. It may be repeated once a week, or once in ten days, and after the operation of each purge.

"Take a large handful of the raſpings or ſhavings of guaiacum, pomegranate bark, and balauſtines bruiſed, of each an ounce; galangals and liquorice root ſliced, of each half an ounce: let theſe be boiled in ſix quarts of ſmith's forge-water, to three pints; and while it is warm, infuſe in the decoction two drams of ſaffron, and half an ounce of diaſcordium."

Let this be divided into two drinks, and give one after the purge has done working, and the other after two days intermiſſion; in cold weather the drinks ſhould be warmed before they are adminiſtered: the ſame may be complied with after the laſt purge, and repeated as often as may be neceſſary, continuing to give the horſe conſtant exerciſe in the open free air; and this will be the likelieſt method to ſtrengthen ſuch horſes, as are of weak relaxed conſtitutions.

But where ſuch a habit is contracted by too much feeding, eſpecially on hot ſcalded diet, which is often the caſe of young horſes kept up for ſale, the beſt way is to bleed and purge ſuch horſes, and at the ſame time to rowel them in the belly; for this ſort of feeding eaſily occaſions horſes to be lax, that have no natural diſpoſition to it; for when they grow ſuddenly fat by ſuch management, the ſecretions from the guts become greaſy, which always cauſes weakneſs and relaxation in them, and often forms a proper nidus for the breeding of vermin; all which may be eaſily remedied by purging in the firſt place, and afterwards by proper exerciſe, and a clean diet.

As for thoſe horſes that are of a hot fiery diſpoſition, and loſe their appetites by their heat and fretting, it is a caſe that cannot eaſily be remedied, becauſe of the natural inflammatory diſpoſition of their blood; the only method is to keep them to a cool diet while they are young, and, in country places, to let them run abroad, eſpecially where they have ſtables and warm ranges, to keep them from the inclemency of the weather in winter; for theſe ſort of horſes are always tender, being, for the moſt part, extremely thin ſkinned, and their blood of a thin texture, and eaſily put in motion. For the ſame reaſon, the beſt way, in ſummer, is to bring them up in the day time, and only let them run abroad in the night, they being more hunted with the flies than any other, which keeps them continually upon the fret, and hinders them from thriving. When ſuch horſes live till they are full aged, their heat and fierineſs often abates, ſo that they grow more uſeful; but while they are young, they are more ſubject to inward impoſthumations than horſes of a cooler temperament; and theſe often kill them ſuddenly, or bring them into lingering conſumptive maladies, which in ſome meaſure may be prevented by the above method. *Gibſon on the Diſeaſes of Horſes.*

Vitiated,

Vitiated, or *Voracious* APPETITE, is that where the animal is always craving for meat. *See* FOUL-FEEDING.

APRIL, the fourth month of the civil year, conſiſting of thirty days.

This month is the beſt month, if the weather be dry, to ſow barley and white oats, to deſtroy weeds, and alſo to fallow land.

Fell the timber you intend to bark, if the ſpring be forward: cleanſe and rid your coppices, and preſerve them from cattle: keep geeſe and ſwine out of commons and paſtures, and water new planted trees, if the weather prove dry.

Pick up ſtones on the new ſown land: ſow hemp and flax.

Cleanſe ditches, and get in your manure that lies in the ſtreets or lanes, or lay it in heaps.

Set oſiers, willows, and other aquatics, before they are too forward, and alſo ſlips of roſemary or lavender.

You may throughout this month ſow clover graſs, ſaintfoin, and all French and other graſſes, or hays: plant madder, and be ſelling your winter fed cattle. *Mortimer's Huſbandry.*

AQUATICS, or *aquatic* plants, ſuch plants and trees as grow in water.

Thus, the willow, oſier, water-creſſes, brook-limes, &c. are aquatics.

ARABLE *land*, ſuch land as is tilled, or cultivated for the production of corn.

ARAIRE, the name of a ſmall plough uſed in Provence and Languedoc, in France.

It conſiſts of a ground wriſt, *a*, *b*, (Plate I. Fig. 3.) from three to four feet long, ending in a point towards *b*. The under part of this wriſt, inſtead of being flat, is formed into a ridge, which extends the whole length of it.

This ground wriſt, at the end *a*, terminates in a ſtrong tenon fixed in a large mortiſe, formed at the extremity *d* of the beam *d e*, and is beſides faſtened to the beam by two iron uprights *f g*, which have a head at *g*, and going through the beam are keyed at *f*: the diſtance between the under part of the beam about *f*, and the upper part of the ground wriſt towards *g*, is about fifteen inches. Inſtead of theſe uprights there is ſometimes put a piece of ſharpened wood or iron, as repreſented by the pricked line *h g*, which ſerves inſtead of a coulter.

On the upper part of the ground wriſt is fixed a large iron ſhare *d h* (Fig. 4): the part *d i*, is received into the ſame mortiſe of the extremity *d* (Fig. 3.) in which the tenon of the ground wriſt is faſtened; and the wings of the ſhare *k l* (Fig. 4.) reſt upon the iron uprights *f g* (Fig. 3.)

On the hindermoſt part of this plough is a ſingle lever *m d* (Fig. 3) which ſerves for a handle: at the end *d*, where it is bent, it enters, as well as the ground wriſt and ſhare, into the great mortiſe *d*, at the end of the beam; and the whole is ſecured with wedges. The handle ſometimes conſiſts of two pieces lapped one over the other, as at *n*, to lengthen or ſhorten it, according to the height of the ploughman.

By means of the wedges juſt mentioned, the angle which the ground wriſt forms with the beam, may be altered at pleaſure, which makes it plough more or leſs deep. At the hinder parts of the ground wriſts are two earth boards, faſtened at *o*, by a ſtrong wooden pin, which paſſes through both the boards and the ground wriſt.

The beam *d*, *f*, *e*, which is from eight to ten feet long, has an iron bolt at the end *e*, which enters with great eaſe into a large mortiſe made at the extremity *g*, of the piece of wood *q 5 r*, intended to paſs between the oxen, and to which their harneſs is to be faſtened. When a ſingle horſe is uſed in the plough, a ſhaft is ſubſtituted inſtead of the piece of wood *q 5 r*, and faſtened to the end of the beam *e*, by an iron ringlet.

It is evident that this plough goes a greater or leſs depth, according as the draught is more or leſs raiſed. The ploughman, as has been already obſerved, can alter the angle which the ground wriſt forms with the beam, by means of the wedges he drives into the mortiſe of the beam, which receives both the ground wriſt and handle. But theſe directions not being ſufficiently exact, it is neceſſary that the ploughman ſhould lean on the handle *m*, when it cuts too deep, and raiſe it when it makes too ſhallow a furrow: this labour is ſo conſtant, that were the plough to work in a ſtrong ſoil, the ploughman could not ſupport it. The two little earth boards *p p*, turn over to the right and left the earth that has been looſened by the ſhare; but this is not done ſo regularly as when there is but one earth board, which throws the earth into the furrows before made, asfaſt as it comes out of that which the plough is forming: it is however certain, that the ground wriſt being ridged, the ploughman always reſts it on one ſide, which occaſions the greater part of the earth to be thrown one way.

Theſe ploughs having no coulters, the earth is not cut vertically at all: for neither the piece of ſharpened wood, nor the ſheath which joins the ground wriſt to the beam, and which is placed a little before the ſmall iron bars *f*, *g*, can be eſteemed a coulter. The bar repreſented by the pricked line *h g*, may ſerve inſtead of a coulter, but it muſt then be made of iron; and in this caſe the coulter would be very improperly ſituated, for it ſhould by rights be before the ſhare.

Theſe ploughs are very convenient to uſe among trees, or in vineyards; they may alſo ſerve to ſtir the ground in the intervals between the rows of ſaint-foin and lucerne; but then ſhould be rather called cultivators, than ploughs. *Du Hamel's Eelemens d' Agriculture.*

ARCHIMEDES's *ſcrew*, a kind of ſpiral pump, for raiſing water, ſo called from Archimedes, its inventor.

It conſiſts of a long cylinder, with a hollow pipe, tube, or groove coiled round it, as repreſented on Plate I. Fig. 5. where A B ſhews the cylinder, and C D the tube open at each end. It is placed in an oblique poſition to the horizon, with the lower end in the water to be raiſed, and the other ſupported by the pivot below the winch J K, by which the tube and cylinder are turned round.

As ſoon as the ſcrew is immerſed in the water, it immediately riſes therein by the orifice C, to the level of the ſurface of the water E F; and if the point of the ſpiral tube, which in the beginning of the motion is coincident with the ſurface of the water, happens not to be on the lower ſide of the cylinder, the water will, upon the motion of the ſcrew, move on the ſpiral tube, till it comes to the point which is on the other ſide, and coincident with the ſurface of the water; when it is arrived at that point, as ſuppoſe at O, it cannot afterwards poſſeſs any part of the ſpiral, but that which is upon the loweſt part of the cylinder; for it cannot move from O towards

towards H or G. becauſe they are ſituated higher above the horizon; and ſince this will conſtantly be the caſe, after the water in the ſpiral has obtained the point O, it is plain that it muſt always be on the under part of the cylinder.

But becauſe the cylinder is in motion, every part of the ſpiral ſcrew from O to D, will, by degrees, ſucceed to every part thereof from O to D, as it comes on the lower ſide; that is, it muſt aſcend on the lower part of the cylinder through all the length of the pipe, till it comes to the orifice at D, where it will run out, as having nothing farther to ſupport it.

This engine may be very uſeful in raiſing water, foul with ſand, &c. as the leathers of pumps will be ſoon deſtroyed by theſe particles. And it was principally this reaſon that induced the ingenious Mr. Smeaton to erect a machine of this kind in the gardens of her royal highneſs the princeſs dowager of Wales at Kew, where it is worked by horſes, and ſupplies all the ponds, &c. in that extenſive garden with water. A machine of this kind, turned by a wind-mill, might be of great uſe in draining lands in ſeveral parts of England, as it is not ſubject to be out of order, and might be made to raiſe a very large quantity of water to a ſmall height. We ſhall deſcribe ſeveral other contrivances for this purpoſe when we come to treat of draining of lands, there being many very curious and uſeful engines of this kind depoſited in the machine room of the ſociety for the encouragement of arts, &c. *See the article* DRAINING *of* LANDS

ARCHIMEDES's *ſcrew*, is an engine of great uſe, for raiſing water a few feet high. The beſt way of making it is, not with a hollow pipe coiled round the ſhaft or axis, which would be liable to many accidents, but by cutting a ſpiral groove about an inch deep, and the ſame wide, round the axis, and extending near the whole length of it. Narrow boards of oak are fitted to the groove, and made to join very cloſe to each other ſideways. They are then ſawed off very even, and to the ſame height above the ſhaft, and narrow deal boards, cloſe jointed, nailed upon the tops of the oaken boards, forming a hollow cylinder, which is bound with iron hoops. One end of this cylinder being dipped in the water, the other end is raiſed the intended height, and by turning the cylinder or barrel round, the water is raiſed, as before explained. If the barrel was raiſed perpendicular, the engine would have no effect, for no water would be raiſed. In general, the higher the upper end of the engine is raiſed, it diſcharges the leſs water, and is the eaſier worked: the beſt poſition is to place it obliquely, ſo that the barrel makes an angle about 45 degrees from the perpendicular.

Sometimes this engine is made with only a ſingle ſpiral partition or thread; and ſometimes with a double one, which is found to raiſe more water than the ſingle: but when there are three ſuch parallel threads in the barrel, it does not raiſe ſo much water as with two.

This engine is liable to few accidents, and if well conſtructed, pitched within and without, and kept in a houſe, or under a dry ſhed, when not in uſe, will laſt a long time, with very little repairing.

The barrel may be made a little wider at the upper end, than at the lower, that goes in the water, which anſwers two purpoſes; one is, that if the water is foul, the mud, ſand and gravel, is not apt to ſtick by the way in riſing, as it might do, if the barrel was a cylinder, equal in diameter throughout its whole length. And by making the barrel a little conical, the iron hoops take the better hold, and draw the joints of the covering boards the cloſer. Theſe boards may be of deal, for lightneſs.

The quantity of water that a ſcrew engine will raiſe, depends upon various circumſtances, the number of threads in the barrel, its ſize, elevation, &c. In general, if an engine of two threads, is 18 feet long in the barrel, is elevated to an angle of 45 degrees, it will throw out all the water that ſprings up in a ſurface of from two to three thouſand ſquare feet; and will keep a pond, or bottom of a lock or ſluice dry enough for men to ſtand in and repair it: this, however, is to be underſtood, where the bottom and ſides of the pond is of a pretty cloſe ſoil: for if the ſoil is very ſandy, gravelly, and porous, the water will force through ſuch a ſoil too faſt, for one ſuch engine to keep the pond dry; the 18 feet long, is the largeſt ſcrew engine commonly made.

The engines of this ſize are worked with horſes, proper wheel-work being fixed to the upper end of the ſhaft for that purpoſe. Twelve horſes are neceſſary to turn it, four each time; and ſometimes ſixteen horſes are neceſſary. There are frequently ſmaller ſcrew engines made, to be turned by men, with a crank or bent handle, at which four or five men can work at once, and the men changed every four hours: theſe anſwer very well where the water to be raiſed is in ſmaller quantity. Theſe engines raiſe the water about four, five, and ſometimes ſix feet high, and throw it over a bank or wall.

ARDERS, fallowings, or plowings of land.

ARK, a large cheſt to put corn or fruit in, like the bin of a buttery.

ARLES, or EARLES, earneſt; thus an arles-penny, ſignifies an earneſt penny.

AROMATIC, an epithet applied to ſuch plants, and other bodies, as yield a fine fragrant ſmell, and have a warm ſpicy taſte.

ARPENT, the French name for an acre. *See* ACRE.

We have already obſerved under the article *acre*, that the French arpent contains 100 perches of twenty-two French ſquare feet, which is equal to about one acre and three quarters of a rood Engliſh meaſure. But it may be neceſſary to add here, that the French have three different arpents, diſtinguiſhed by the epithets *little*, *middle*, and *great* arpent.

The little ARPENT contains 100 perches of eighteen feet and a half ſquare; conſequently its ſuperficial meaſure is 32,400 French feet, equal to 34,603 feet, or three rood, ſeven perches, and twenty-ſeven feet Engliſh meaſure.

The middle ARPENT, conſiſts alſo of 100 perches, twenty feet ſquare, which make 40,000 French feet ſuperficial meaſure; equal to 42,720 feet, or three rood, thirty-ſix perches, and 149 feet Engliſh meaſure.

The great ARPENT, contains ten perches of twenty-two ſquare perches. *See the article* ACRE.

ARTIFICIAL GRASSES, ſuch as are introduced into the field with great care, and cultivated afterwards with much diligence. Such as burnet, clover, lucern, ſainfoin, ray-graſs, ſpurry, &c. *See the method of cultivating each under its proper article.*

ARTIFICIAL PASTURE, ſuch lands as are properly

cultivated and ſown with the above plants, or any other that yield a great deal of fodder for cattle.

ASCARIDES, ſmall worms common in horſes, reſembling needles, ſome of them white, and ſome of an azure colour, with flattiſh heads. They are often called needle-worms by the farriers.

Theſe worms are very troubleſome, and hard to be rooted out, and expoſe horſes to frequent gripes, and other fretting uneaſy diſorders in their guts. They breed at all times of the year, and often when one brood is deſtroyed another ſucceeds. They are not mortal; but when a horſe is peſtered with this ſort of vermin, though he will go through his buſineſs tolerably well, and ſometimes feed heartily, yet he always looks lean and jaded; his hair ſtares as if he was ſurfeited, and nothing he eats makes him thrive; he often ſtrikes his hind-feet againſt his belly, which ſhews where his grievance lies, and is ſometimes griped, but without the violent ſymptoms that attend a cholic, or ſtrangury, for he never rolls or tumbles, but only ſhews uneaſineſs, and generally lays himſelf down quietly on his belly for a little while, and then gets up and falls a feeding; but the ſureſt ſign is when he voids them with his dung.

Theſe ſmall worms ſometimes come away in great numbers with a purge, and ſome horſes get clear of them by purges only; but this does not often happen; for the horſes that breed aſcarides are, above all others, ſubject to ſlime and wormy matter. They ſeem to have their lodgment about the beginning of the ſmall guts, near the ſtomach, among the concocted aliment or chyle, both from their colour, the ſymptoms of the gripes, and the ſudden fits of ſickneſs theſe horſes are often ſeized with, which ſometimes make them abruptly leave off their food, for a few minutes, and fall greedily to it again as ſoon as the ſick fit is over. They are ſeldom ſeen, except when a horſe has had a purge given, or when he falls into a natural purging, which thoſe horſes are often ſubject to, and then they come away in very great numbers, with much ſlime and naſtineſs. They not only make a horſe grow lean, and look ſurfeited, but in opening his mouth, one may perceive a more than ordinary languid whiteneſs, and a ſickly ſmell, from the want of thoſe due ſupplies of blood and nouriſhment, which give a livelineſs to the colour that is always perceivable in ſound vigorous horſes; ſo that whatever be the primary cauſe, theſe worms ſeem, in a great meaſure, to proceed from a vitiated appetite, and a weak digeſtion, which renders them the more difficult to be removed; for which reaſon recourſe muſt be firſt had to mercurials, and after theſe, to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and give a better tone to the ſolids.

To a horſe, therefore, that is troubled with theſe ſmall, white, or azure coloured worms, the following method may be obſerved:

"Take of calomel that has been often ſublimed and well prepared, two drams; diapente half an ounce; make it into a ball, with a ſufficient quantity of conſerve of wormwood, or of rue, and give it in the morning, keeping the horſe from meat and water four hours before, and four hours after taking it."

The next morning adminiſter the following purge, taking great care to keep the horſe from wet, or from any thing that may expoſe him to catch cold.

"Take Barbadoes, or plantation aloes, one ounce; ſalt of tartar, two drams; freſh ginger grated, a dram and a half; oil of amber a middling ſpoonful: make the whole into a ball with flour or liquorice powder."

This purge may be worked off in the ſtable with warm water, which is much the ſafeſt way when mercurials are given. The calomel ball and purge may be repeated in ſix or eight days; and again in ſix or eight days more.

When a horſe has gone through a courſe of theſe mercurial purges, let the following drink be given two or three times a week, and continued till the horſe begins to thrive and look healthful.

"Take rue, camomile flowers, and hore-hound, of each a handful; galangals, bruiſed in a mortar, three drams; liquorice root, ſliced, two drams: boil it in a quart or three pints of forge-water five or ſix minutes, in a covered veſſel, and keep it covered till cold: then ſtrain it through a piece of coarſe canvas, and give it in the morning upon an empty ſtomach." *Gibſon on the Diſeaſes of Horſes.*

ASH, or ASH-TREE. There are ſeveral ſpecies of the aſh-tree cultivated by curious perſons for the ſake of variety; but what deſerves attention in a work of this kind, is the common aſh, called by botaniſts, *fraxinus foliolis ſerratis, floribus apetalis*; and is ſo well known as to need no deſcription.

This tree propagates itſelf in plenty by the ſeeds which ſcatter in the autumn; ſo that when the ſeeds happen to fall in places where cattle do not come, there will be plenty of plants come up in the ſpring; but when any perſon is deſirous of raiſing a quantity of the trees, the ſeeds ſhould be ſown as ſoon as they are ripe, and then the plants will come up in the following ſpring; but if the ſeeds are kept out of the ground till ſpring, the plants will not come up till the year after; the ground therefore ſhould be kept clean all the ſummer where they are ſown and not diſturbed, leſt the ſeeds ſhould be turned out of the ground, or buried too deep to grow.

When the plants are come up, they muſt be kept clean from weeds during the ſummer; and, if they make good progreſs in the ſeed-bed, they will be fit to tranſplant by the following autumn; ſome ground ſhould, therefore, be prepared to receive them; and as ſoon as their leaves begin to fall, they ſhould be tranſplanted. In taking of them up care ſhould be taken not to break or tear off their roots; to prevent which they ſhould be taken up with a ſpade, and not drawn up, as is frequently practiſed; for as many of the plants which riſe firſt from ſeeds will out-ſtrip the others in their growth, ſo it is frequently practiſed, to draw up the largeſt plants, and leave the former to grow a year longer, before they are tranſplanted; and to avoid hurting thoſe that are left, the others are drawn out by hand, and thereby many of their roots are torn off, or broken. It is, therefore, much the better way to take all up, little or big, together, and tranſplant them out, placing the large ones together in rows, and the ſmall ones by themſelves. The rows ſhould be three feet aſunder, and the plants a foot and a half diſtance in the rows. In this nurſery they ſhould remain two years, by which time they will be ſtrong enough to plant where they are to remain, for the younger they are planted out the larger they will grow; ſo that where they are deſigned for uſe, they ſhould be planted very young; nor ſhould the ground where they are raiſed be better than that where they are deſigned to grow.

grow. For when plants are raiſed in good land, and afterwards planted into worſe, they very rarely thrive; ſo that it is much the better method to make the nurſery upon a part of the ſame land, where the trees are deſigned to be planted, and then a ſufficient number of the trees may be left ſtanding upon the ground, and theſe will outſtrip thoſe which are removed, and grow to a larger ſize.

Where people live in the neighbourhood of aſh-trees, they may ſupply themſelves with plenty of ſelf-ſown plants, provided cattle are not ſuffered to graze on the land; for if cattle can come at them, they will eat off the young plants, and not ſuffer them to grow; but where the ſeeds fall in hedges, and are protected by buſhes, the plants will come up and thrive: in theſe hedges the trees are frequently permitted to grow till they have deſtroyed the hedge, for there is ſcarce any tree ſo hurtful to all kinds of vegetables as the aſh, which robs every plant of its nouriſhment within the reach of its roots, and ſhould therefore never be ſuffered to grow in hedge-rows; for they not only kill the hedge, but impoveriſh corn, or whatever is ſown near them. Nor ſhould any aſh-trees be permitted to grow near paſture grounds, for if any of the cows eat of the leaves or ſhoots of the aſh, all the butter that is made of their milk will be rank, and of little or no value. In all good dairy countries therefore they never ſuffer any aſh-trees to grow.

If the wood of theſe trees be rightly managed, it will turn greatly to the advantage of its owner; for by the underwood, which will be fit to cut every eight or ten years, there will be a continual income more than ſufficient to pay the rent of the ground, and all other charges; and ſtill there will be a ſtock preſerved for timber, which in a few years, will be worth forty or fifty ſhillings per acre.

This timber is of excellent uſe to the wheel-wrights and cart-wrights for ploughs, axle-trees, fellies of wheels, harrows, oars, blocks for pullies, and many other purpoſes.

The beſt ſeaſon for felling theſe trees is from November to February; for if it be done either too early in the autumn, or too early in the ſpring, the timber will be ſubject to be infeſted with worms, and other inſects: but for lopping of pollards the ſpring is preferable for all ſoft wood. *Miller's Gard. Dict.*

ASHES, the earthy particles of combuſtible ſubſtances remaining after they have been burnt.

If the aſhes are produced from vegetables bodies, they contain a conſiderable quantity of fixed ſalt, blended with the earthy particles, and from theſe particles, the alcaline ſalts, called pot-aſh, pearl-aſh, &c. are extracted.

Aſhes of all ſorts contain in them a very rich fertile ſalt, and are the beſt manure of any to lay upon cold lands, eſpecially if kept dry, and the rain doth not waſh away their ſalts. One load of dry aſhes will go as far as two not kept ſo. But as rain water diminiſhes their ſalts, ſo the moiſtening them with chamber-lie, or ſoap-ſuds, will add greatly to their ſtrength. Two load of theſe aſhes will manure an acre of land better than ſix load of thoſe that are expoſed to the rain, and that are not ordered ſo, which is the common allowance for an acre, though ſome lands require more, and ſome leſs. That the aſhes of any ſort of vegetables are very advantageous to land, is what is experienced in moſt places of England, by the improvement that is made by burning of fern, ſtubble, ſtraw, heath, furze, ſedge, bean-ſtalks, &c. *Mortimer's Huſbandry.*

Coal ASHES from their calcarious quality, are ſingularly beneficial to ſtiff and ſour land, for which purpoſe they are ſucceſsfully uſed in the neighbourhood of ſome great cities, where coal is burnt for fuel. They open clayey grounds, and correct their bad qualities. The gardeners and farmers about London know their value, and make a very profitable uſe of them, particularly to bring into order thoſe grounds which have been dug for brick-earth. After ſpreading theſe aſhes upon the clay bottom, they either ſow horſe-beans, or ſet the early Spaniſh, and ſometimes the Windſor-bean in thoſe ſpots; or elſe they lay ſuch lands down with rye-graſs, which generally ſucceeds very well. Mr. Bradley blaming the people of Staffordſhire, and the counties adjoining, where there are coal-pits, for not improving their heavy grounds around thoſe pits, by manuring them with coal-aſhes, which might be eaſily burnt out of the waſte-coals, ſays, "that wherever there are plenty of coal-pits, there can be no want of good profitable land." *Bradley's Huſbandry.*

Mr. Mortimer agrees entirely with Mr. Bradley, eſteeming ſea-coal aſhes as the beſt manure of any for cold lands, the moſt laſting, and the fitteſt to kill worms. Their ſharp and drying quality opens the pores of ſtiff ſoils, and diſcharges a great deal of their viſcous quality. Mr. Worlidge looks upon them as an excellent compoſt when mixed with horſe-dung; he adds, that they are a great curer of moſs and ruſhes in moſt grounds. *Worlidge's Huſbandry.*

Kiln ASHES, made of ſtraw, furze, &c. are a good manure for almoſt any kind of ſoil. In the weſt of England farmers ſift them over their corn and graſs; but this muſt not be done in windy weather, becauſe they are ſo very light that they would be eaſily blown away. They ſucceed beſt when laid on juſt before rain or ſnow. *Mill's Huſbandry, vol.* I.

Peat ASHES are likewiſe a very good manure. Mr. Miller is of opinion, that they are greatly bettered by being mixed with lime before they are laid on the land.

Mr. Ellis has rightly obſerved, that there is a conſiderable difference between the aſhes of lean peat, and thoſe produced by the fatter kind. If barley, ſays he, be ſown ſo late as the beginning of May, lean peat-aſhes in particular may be applied over it, or harrowed in with the grain; but aſhes burnt from fat black peat, ſuch as is dug at Newbury, are of ſo ſulphureous a nature, that farmers are afraid to lay them on their barley, nor do they dreſs their wheat with them till the ſpring is advanced, and then they are ſown over it.

The earth of which this rich manure is made, is taken from a black mooriſh ground, with a narrow wood ſcoop, which brings it out like a long brick. Theſe pieces of ſwampy earth are laid on the ground to dry in the ſummer; after which they ſell for eight ſhillings a waggon load, for fuel. But when they are to be uſed for manure, after being dried, they are burnt in heaps of ten, twenty, or thirty loads, laying on more peat upon the outſides, as the fire increaſes within, to keep it from having too much vent.

The great uſe of theſe aſhes was diſcovered about fifty years ago; but they ſoon fell into diſrepute, owing

to the injudicious management of people, who imprudently laid on too great quantities of them at a time, by which means the corn was burnt. Afterwards they found that ſix, or at moſt ten buſhels, were ſufficient to be ſown over an acre of wheat, peaſe, turnips, clover, rape ſeed, or ſaint-foin, as early as could conveniently be done. But ſtill many are afraid to ſow them over barley, leſt a dry ſeaſon ſhould enſue, and burn it up: for theſe aſhes are thought to contain three times as much ſulphur as there is in coal-aſhes. This is reaſonably ſuppoſed from their very ſtrong ſulphureous ſmell; their ſparkling and jumping when ſtirred while burning, and their drying up corn by their too great heat. Theſe peat-aſhes, as likewiſe thoſe of wood or coal, will help to keep off the ſlugs from peaſe and other grains, by the ſalt and ſulphur contained in them, and conduce very much to their preſervation in cold wet ſeaſons. But no danger of over-heating need be feared from the aſhes of that peat which grows, as turf, over ſandy bottoms, as great quantities do on Leighton heath in Bedfordſhire; for the'e are as much too lean, as the others are too rank. *Ellis's Modern Huſbandman, vol* II.

Theſe aſhes are produced from land that is black and crumbly at top, under which lies the peat, to the depth of ſeveral feet. They do not burn the peat in the field for aſhes, by choice, becauſe the peat is burnt for the aſhes when it cannot be dried ſufficiently for ſale: and then it is burnt in large heaps, with a ſmothering fire: as is likewiſe the ſuperficial black earth or moory ſoil, together with the refuſe of the peat: the aſhes of theſe are laid up in round or long heaps, riſing at top like the ridge of a houſe, in order to throw off the rain, and keep them dry, till they are ſold. Sometimes they are laid under dry ſheds, or in-houſes, to ſave them from wet, which they cannot be wholly protected from, by laying them up n ridges, expoſed to the weather, into which the rain penetrates for ſome inches deep: and theſe aſhes are never ſo good manure as thoſe that are kept dry.

Near the ſurface of the peat-earth here, there is ſometimes a bed of whitiſh earth, called maum, which is a compoſition of earth, and very ſmall ſhells of the periwinkle kind: this is alſo burnt to aſhes for manure, and the quantity of it is in ſome places ſo great, that the aſhes are of a whitiſh colour; and thoſe from the peat or mooriſh earth are reddiſh. The white aſhes are eſteemed to be as good manure as the red: and being a kind of ſhell-marl, would make good manure without being burnt; as indeed they rarely are thoroughly, tho' they ſeldom lay them upon land, till they have paſſed the fire, or are mixed with the aſhes of the peat-earth. The aſhes of the peat ſold for fuel, and burnt in chimnies, are a much ſtronger manure than the aſhes burnt in the field; and if care is taken to keep them dry, are ſold for about double the price of the field-aſhes.

We muſt not here omit the account which the ingenious Mr. du Hamel has given of a kind of peat-aſhes made in France, as the ſame kind of earth with that from whence they are burnt may be doubtleſs found in many parts of England, if farmers would give themſelves the trouble to ſearch for it.

This peat is a blackiſh earth, reſembling the ſoil of ſome meadows. When burnt it emits a thick, diſagreeable ſulphureous vapour. A certain degree of moiſture helps to make it burn, though even then it waſtes but ſlowly. After it has once taken fire it burns of itſelf, but without producing any flame. It is of ſo cauſtic a nature, that it would ſtrip off the ſkin of the hands and feet of the men who knead it, if they did not take proper precautions againſt that inconvenience. Its aſhes retain this cauſtic quality; for the hands of thoſe peaſants who ſtrew them are often hurt by it, if the air be at all damp. This earth, in its natural poſition, runs in veins of different ſizes; ſometimes ſeven or eight feet thick, and thirty or forty feet long; and ſometimes they extend four or five hundred feet; after which the vein often fails at once, and perhaps is not found again till two or three miles off. Theſe veins generally lie pretty near the ſurface of the earth, ſeldom deeper than twelve or fifteen feet.

This earth is found only in marſhy places, which muſt ſometimes be drained before it can be come at. It ſhews itſelf by a ſlimy ſkin over the adjacent waters.

Three pounds of this earth being diſtilled in a retort, produced fifteen ounces of a bituminous oil, reſembling that extracted from pit-coal; and the reſiduum yielded, when waſhed, about half a pound of vitriol.

The method of preparing this earth, in order to render it fit for fertilizing land, is as follows: water is thrown over it, and two or three men knead it with their feet, till they bring it to the conſiſtence of a paſte, which is then made into cakes ſeven or eight inches in diameter. Theſe cakes are laid by to dry, though not to ſuch a degree but that there ſtill remains a little moiſture in them, that being neceſſary to facilitate their burning.

The cakes thus prepared are piled up in the form of a pyramid, with ſufficient ſpaces between them for the fire to penetrate; and under this pyramid, which is built upon a kind of hearth, a little ſtraw and bruſh-wood is laid to ſet them on fire. Two or three days after their aſhes are ſpread with a rake, that they may cool. Some veins of this earth yield white aſhes, but they are not ſo good as thoſe of a reddiſh hue.

From fifty to ſeventy pounds of theſe aſhes are ſpread upon each acre of land in April or May; and in about a week's time the blades of corn, or graſs, if it be paſture ground, aſſume a new verdure, and appear ſurpriſingly ſtrong, even in the coldeſt ſoils.

Some of theſe bituminous earths are better than others. Care muſt be taken to begin to rake out the aſhes of each pyramid as ſoon as the greater part of it is burnt; for they would loſe a great deal of their virtue, if left on the fire till all that is inflammable be conſumed: nor would the fire go out in leſs than a fortnight or three weeks, if they were not ſcraped away as they are formed.

It would be needleſs to mention, that a greater quantity of the aſhes of an inferior quality muſt be uſed, than thoſe that are ſtronger, and conſequently better; but it may not be amiſs to obſerve, that, in general, wet lands require more than dry ſoils. The effects of this manure will be manifeſt for two or three years. It might be dangerous to renew it every year. *Traité de la Culture de Terres. tom.* V. *pag.* 226.

Pot ASHES are the refuſe or aſhes remaining after the ſalt, called pot-aſhes, is extracted from them.

Theſe aſhes are of great ſervice to moſt ſorts of land; but as they have been in a great meaſure deprived of their ſalts, it is neceſſary to lay them on much thicker than other aſhes. A buſhel and a half of theſe may be uſed for a buſhel of freſh aſhes: but they ſhould always be

be mixed with ſome other light ingredient, which may be uſed in any quantity, if laid on very ſtiff land. If the land be not over ſtiff, they may be laid upon it with leſs mixture. *Bradley's Huſbandry.*

Soap ASHES are a compoſition of wood-aſhes and lime, remaining after the ſoap-makers have drawn off their lye.

Soap-aſhes are likewiſe a very valuable manure, but there is great difference in the quality and effects of them. Thoſe from wood-aſhes are the weakeſt ſort of them; for the wood-aſhes being very light and ſpongy, their ſalts are ſoon diſſolved, and extracted by the lye; ſo that there remain but very few ſalts in the aſhes. But when the ſoap-boilers make uſe of kelp, which they ſometimes do, inſtead of wood-aſhes, the kelp being of a harder conſiſtence than wood-aſhes, the parts of it are not ſo eaſily ſeparated by the lye, and much more of the ſalts remain in the aſhes. But the ſoap-boilers uſe another kind of pot-aſh, called barilla, which is imported from Spain in large lumps, which are much harder than common pot-aſh: and though the ſoap-boilers break this ſort very ſmall, and ſometimes ſcreen or ſift it, much more of its ſalts remain in it than in the pot-aſh; ſo that the aſhes from the barilla are ſtronger than any other, and if the ſame quantity of them was laid upon land, as is commonly laid of the wood-aſhes, they would burn and deſtroy the crop. Farmers ſhould therefore uſe ſoap-boilers aſhes with caution, till they know their quality and ſtrength. Wood-aſhes and pot-aſh are uſed in various places for making ſoap; but in and near London, very little of any but barilla. The aſhes from the barilla are a ſtrong rich manure, and ſold at 5s. per cart-load. They are not now ſo good as formerly, the ſoap-makers having found means to extract more of their ſalts from them; as they have alſo the ſalts from the lye, which were formerly rather ſuperior to the aſhes, as a manure, and was to be had for nothing, being all thrown away as uſeleſs.

They are an excellent manure, and were firſt uſed by the Flemings with very great ſucceſs. Two loads of theſe aſhes are ſufficient for an acre of arable land; and by the aſſiſtance of this manure the ground will not only yield a large crop, but may be ſown yearly, without leaving it fallow at any time. They ſhould be laid on the ground in the beginning of winter, that the rain may more eaſily diſſolve and waſh them in. Sir Hugh Platt tells us, that by manuring a piece of barren land at Biſhop's-hall in Middleſex, in the year 1594, he obtained an excellent crop of ſummer barley; that he meaſured the ſtalk and ear of one of theſe plants, and found it to be an ell and three inches in length, from the ground to the ſummit of the ear. We have given a figure of this ear of ſummer barley in its natural ſize, on Plate III. Fig. I. *Platt's Jewel-houſe of Art and Nature.*

A writer in the *Muſeum Ruſticum* declares, that he has for many years paſt received great benefit by uſing ſoap-aſhes as a manure, with which he almoſt conſtantly dreſſes his wheat lands; but never uſes it alone, on account of its hot burning quality.

"My method, adds he, is to make a large heap of dung and earth, that is two loads of earth to one of dung, placed in alternate layers to rot. After this has undergone a ſtrong fermentation, I cauſe the whole heap to be turned and well mixed, leaving it ſome time longer to mellow.

"I then procure the ſoap-aſhes, and mix them with the compoſt, in the proportion of one load of aſhes to ten of the compoſt, leaving, for ſome time, the whole to mellow together.

"When wheat ſeed-time comes, about the latter end of September, I cauſe about ten cart-loads of this rich compoſt to be laid in little heaps on each acre of the land I intend to ſow with wheat: this manure is immediately ſpread, and, ſowing my wheat broad caſt, I plough it in together with the compoſt.

The advantage reſulting from this practice, on ſtiff ſoils, are many; and particularly, if the farmer is the leaſt careful in preparing his tilth, he will have a clean crop, free from ſmut or weeds; a matter of no ſmall conſequence to him.

"I have tried this manure on lighter lands, and find it anſwer extremely well, provided it has lain a conſiderable time in the compoſt heap, to mellow and abate its natural heat; but it agrees beſt by far with clayey ſoils, and in ſuch is well worthy of being recommended as an excellent dreſſing for a wheat crop." *Muſeum Ruſt. vol.* IV. *pag.* 339.

Turf ASHES are a good manure, but much inferior to peat-aſhes. Of this I ſaw once a remarkable inſtance. A field, whereof the ſoil was a poor gravel, and had a crop of the broad or red clover growing upon it, was dreſſed one ſide of it with peat-aſhes, and the other ſide with turf aſhes; the farmer laid upon this field all the aſhes he had of theſe two ſorts, and the middle of the field had no dreſſing. The clover in the middle part not dreſſed was a very poor crop, the plants being ſhort, yellow and ſtunted. The ſide dreſſed with turf-aſhes was much better than the middle, the plants being taller, of a better colour, and promiſed to be double the crop of the undreſſed: but that ſide dreſſed with peat-aſhes, produced a crop that appeared to be as much ſuperior to the part dreſſed with the turf-aſhes, as this laſt was ſuperior to the middle that had no dreſſing. The aſhes were ſown upon the clover by hand, and the improvement made upon the clover was ſo great, that the caſt of the ſower's hand was extremely plain next to the middle, and appeared like an indenture: and the vigour of the plants there, was ſo much greater than the undreſſed plants, that the extent of the peat-aſhes, might be plainly diſtinguiſhed almoſt to an inch. This obſervation was made in the beginning of ſummer before the clover had arrived to its full growth.

Turf ASHES, the aſhes procured by burning turfs, or the parings of the ſurface of heathy and mooriſh land. *See the article* BURN-BAKING.

Theſe parings, or turfs, are cut in a dry ſeaſon, and ſet up to dry thoroughly, leaning one againſt another; and, when dry, are piled into ſmall heaps or piles, about a quarter or half a load, in each, carried up exactly ſquare to a certain height, and then drawn up gradually in a pyramidical manner, ſo as to throw off any accidental ſhowers. In a very dry ſeaſon even the covering of theſe piles may be carried home, and ſlacked or burned indiſcriminately with the reſt; but in a wetter ſeaſon it is uſual to ſeparate and dry thoſe topmoſt turfs, if the weather allows, and to ſlack them ſeparately, to be uſed

on

on the tops of fires, when large, as dampers. A ſtout labourer will, in a day, cut two waggon loads of theſe turfs. The women and children can ſet them up to dry, and the women can pile them up.

Theſe aſhes, (in the moors of Yorkſhire, where, as the Rev. Mr. Comber informs us they are greatly uſed, the principal firing being turfs) are carried out daily, or once in two or three days, to the dunghill; and the farmer takes the opportunity of his firſt leiſure towards the end of the year, to carry them out to his meadow land, on which he lays them thicker or thinner, as he has more or leſs land which he apprehends to want them, or more or leſs of them. The firſt rains waſh them in, and the next ſummer never fails to ſhew their good effect.

It will be eaſily imagined, that as theſe aſhes are much finer, or more pulverized than thoſe of coals, ſo they more inſinuate themſelves into the ſoil, but are, in their effects much leſs laſting. However, as every year brings a conſiderable ſupply, the farmer is leſs concerned that they are not a laſting manure.

In the moors of Yorkſhire, the farmer is ſo ſenſible of the efficacy of theſe aſhes, that it is become a proverb among them, "The better fire, the richer farmer." In conſequence of this principle, the farmer endeavours to procure all the aſhes he can from the cottagers who have no land. And hence a happy connection ariſes; for the poor cottager finding the article of carriage the chief part of the expence of his fuel, is wiſe enough to bargain with the farmer to bring him home ſuch a quantity of his turfs in conſequence of his aſhes.

Some farmers lay theſe aſhes on their ground in the ſpring; and if ſhowers follow, they will have their effect in the ſummer crop, though not ſo great as if they had been laid on at the end of the year. It muſt however be remarked, that he who lays on his aſhes in the ſpring, lays on what has been very lately made in the winter; and he who lays on at the latter end of the year, lays on what has been evaporating during the whole ſummer; ſo that it is not eaſy to ſay which method is the better. *Muſeum Ruſticum, vol.* V. *pag.* 311.

ASPEN-TREE, a ſpecies of the poplar, and called by botaniſts, *populus foliis ſubrotundis dentato angulatis utrinque glabris*. Poplar-tree with roundiſh leaves, having an angular indenture, and ſmooth on both ſides.

The leaves of this tree ſtand upon long ſlender foot-ſtalks, ſo as to be ſhaken by the leaſt wind, from whence it has been called the trembling poplar, or aſpen-tree.

The method of cultivating this tree is the ſame in every reſpect as that of the abele-tree. *See* ABELE-TREE.

ASS, a creature well known in moſt parts of Europe, and proves very uſeful in many reſpects, if taken proper care of.

The horſe is trained up, great care is taken of him, he is inſtructed and exerciſed; while the poor aſs is left to the brutality of the meaneſt ſervants, and the wantonneſs of children, that ſo far from improving, he muſt be a looſer by his education, and indeed had he not a large fund of good qualities, the manner in which he is treated is ſufficient to exhauſt them. He is the ſport, the bur, and the drudge of the vulgar; who, without the leaſt thought or concern, drive him along with a cudgel, beating, overloading, and tiring him. We do not remember, that, if there were no horſes, the aſs would be conſidered both with regard to himſelf and us, as the moſt uſeful, moſt beautiful, and moſt diſtinguiſhed of animals. Inſtead of being the firſt, he is now the ſecond; and from this accident alone he is held in no eſtimation. It is the compariſon that degrades him: he is conſidered, not in himſelf, but relatively to the horſe. We forget that he is an aſs; that he has all the qualities of his nature, all the gifts annexed to his ſpecies; and think only on the figure and qualities of the horſe which are wanting in him, and which it would be improper for him to have.

By his natural temper he is as humble, as patient, and as quiet, as the horſe is proud, fiery, and impetuous; he bears with firmneſs, and perhaps with courage, blows and chaſtiſements. He is ſober both with regard to the quantity and quality of his food, contenting himſelf with the moſt harſh and diſagreeable herbs, which the horſe and other animals will not touch. In water he is very nice, drinking only of that which is perfectly clear, and at brooks with which he is acquainted. *Buffon's Hiſtoire Naturelle, tom.* IV.

The aſs, though a contemptible creature, is very ſerviceable to many that are not able to buy or keep horſes; eſpecially were they live near heaths or commons, the barreneſt of which will keep them, being contented with any traſh, dry leaves, ſtalks, thiſtles, briars, chaff, and any ſort of ſtraw is excellent food for them; they require very little looking after, and will ſuſtain labour, hunger and thirſt beyond moſt creatures. They are ſeldom or never ſick; and endure longer than any other creature. They may be made uſe of to plough light lands, to carry burdens, to draw in mills, for which they are very excellent, to fetch water, or any other odd things. They are very uſeful for their milk, which is an excellent reſtorative in conſumptions, and other weakneſſes: but they would be of much more advantage were they uſed, as they are in foreign countries, for the breeding of mules. *See the article* MULE.

The ſhe-aſs, if you have any regard to their breed, ſhould be covered between the months of March and June. The beſt age to breed from is from three years old to ten, and you ſhould let the young aſs ſuck two years, and not work them till they are three years old.

Thoſe are reckoned the beſt ſhaped that are well ſquared, have large eyes, wide noſtrils, long necks, broad breaſts, high ſhoulders, a great back, ſhort tail, the hair ſleek and of a blackiſh colour: their ſkins make the moſt durable ſhoes of any ſort of leather. *Mortimer's Huſbandry, vol.* I. *pag.* 222.

ATMOSPHERE, the vaſt body, or collection of air which ſurrounds the earth to a very conſiderable height.

Clouds, which are precipitated in drops of rain for the ſervice of mankind, do not conſiſt wholly of watry particles; for beſides aqueous vapours and what theſe contain, there are raiſed from the ſurface of the earth into the air, ſulphureous and ſaline particles, which are alſo carried up into the clouds, and mixed with the aqueous vapours. Here we have a mixture of all ſuch ſubſtances, as it were, in their extremely ſmall parts, floating in the air together, and the effects of theſe ſulphureous and ſaline particles, thus mingled with aqueous vapours, are ſometimes very ſenſible, eſpecially in thunder and lightning; when the ſulphureous and nitrous particles taking fire, by the motion ariſing from heat, break out with the violence

violence of flaſhes and noiſe, very much reſembling the effects of gunpowder.

Another proof that there are nitrous particles raiſed into the air, we have in the nourifhment which rain, replete with theſe ingredients, give to plants, more than any other water; and alſo from the collection of nitre or ſaltpetre, in heaps of earth, out of which theſe principles derived from rain are known to be extracted, if theſe heaps of earth be expoſed to the air, ſo as to keep the wet weather from ſpoiling the operation. It is alſo a convincing argument, that theſe nutritive ingredients are of conſequence in vegetation, by plants in water refuſing to grow in droughty weather, notwithſtanding they have ſuch plenty of moiſture; from their being abſolutely at a ſtand when rain has been long a ſtranger to the earth, they are plainly ſeen to go forward with the buſineſs of vegetation, like thoſe plants which have been deprived of motion or growth, when the fine ſhowers deſcend, and continue to do ſo for ſome time.

Here then, in both caſes of the plants in a pond, there is water, but there are only in one theſe vegetative principles, which give motion to the plants, and conſequently thoſe ingredients are abſolutely neceſſary to vegetation; and therefore we may conclude, that water, when properly dilated by fermentation at the roots, is only an aſſiſtant to plants, in applying thoſe neceſſary principles, or helping to conduct them through the tubular interſtices of the fibres, or to float the nitrous particles through the whole ſyſtem of the operation in motion, or growth of vegetables, and not the food itſelf, or any ſort of nouriſhment when diveſted of thoſe principles. Whether, therefore, the ſyſtem of exceeding fine fibres, or tubes of a plant at a ſtand in a pond, in a very droughty ſeaſon, admits that water undilated, for want of nutritive, or fermenting principles, into its body, during the great want of rain; or whether it abſolutely refuſes to imbibe, or cannot attract, for want of a finer diviſion of its parts, any of it, as there are in it no nutritive ingredients, does not ſeem to admit of any doubt in favour of the latter queſtion, which, if true in nature, may poſſibly be of ſervice in the growth of ſome ſorts of plants, and perhaps ſave much trouble in attempting to force others forwards with ſome ſort of water.

Since it is plain, that there is a vaſt quantity of nitrous, ſulphureous, and bituminous matter all over the ſurface of the earth, and that plants and animals abound with volatile ſalts, we need not wonder that the heat of the ſun fills the air with ſuch fine particles, and all ſorts of unctuous exhalations, by firſt expanding them, after which they riſe till they meet with air and other mixtures of the ſame ſpecific gravity. What are uſually called *ignes fatui*, ſeem to conſiſt of a more unctuous ſubſtance than other exhalations, for we find their oily particles are eaſily fixed, but not ſo ſoon ſpent as thoſe of ſulphur and nitre. Shooting ſtars are improperly ſo called, becauſe they are nothing more than exhalations kindled in the air; and if a long train of ſubſtances take fire at once, it is commonly termed a *dart*; and if there be many, and they continue in the ſame place, they are then called *beams*.

Thus we plainly ſee how full the atmoſphere is of theſe rich ingredients for the buſineſs of vegetation; and becauſe they are of ſuch vaſt conſequence to the growth of plants, we will enumerate the ſources of them upon the frame of the globe; from whence the ſun and wind borrow them, in order to diſperſe them properly in the air, that they may intimately mix, and deſcend with the rain drops, and ſo be conveyed to the mouths of the fibrous tubes of plants, with the greateſt care and ſkill; from theſe ingredients firſt leaving the ſurface of the earth, through the whole proceſs of their various motions, configurations, and combinations, till they are prepared in the moſt exquiſite manner to be received into the bowels of vegetables, which we plainly ſee ſtand in great need of them, as without their friendly aſſiſtance, or ſome compoſitions of dung to reſemble them, they are unable from water and earth alone to go forward to maturity.

Salts are of various kinds, but all have a ſharp pungent taſte, though not all alike; and of theſe ſome are dug out of the earth like ſtone out of a quarry; others are made by art, by letting the ſea-water into ſhallow pits on the ſhore, and continue there till the aqueous particles are exhaled by the ſun and wind, and then the ſalt remains at the bottom. The ſalt is in its nature the ſame in both caſes; for the ſaline particles are not made by art in the combination of ingredients to imitate it; they are only ſeparated from the watry particles wherein they floated. The qualities of this excellent ingredient in vegetation are, that it eaſily diſſolves, and melts readily in the open air, if it be refined from all heterogeneous matter; when the water wherewith it is entangled is any ways drawn off, there remains a groſs ſediment, but the finer parts are carried away with it; this ſediment is the only part the fire cannot melt, but reduces it to a calx.

This facility of the finer parts ſwimming, as they are ſpecifically lighter than water, contributes to the benefit of plants; or rather theſe fine ſaline particles are of the ſame ſpecific gravity with the water; that they may intimately mix with it, and be carried in thoſe vapours through all the neceſſary ſtages, till they return to the earth again. This quality of melting and diſſolving in water and air, ſets the finer parts at liberty, and prepares them to take wing with the common exhalations. And yet the ſediment, or groſſer parts, which are left behind, have their excellent uſes in helping the embrios of plants to ſend out their fibrous tubes, in ſearch after more refined particles, which either adhere to the ſuperficies of the particles of earth or are contained in their internal pores.

Nitre, of which there are ſeveral ſorts, natural and artificial, the former refining itſelf, and the latter refined by art, it is a kind of ſalt, which eaſily takes fire, but like ſea-ſalt is eaſily reducible to a calx. The vapours, or particles of nitre, when they deſcend for the uſe of plants, are found to contain abundance of ſpirits; for the nitre, as a ſalt, is impregnated with them, which render it volatile, and the fluid extracted from it is very ſharp and corroſive. The calx to which nitre is reducible, as well as the calx of common ſalt, has its excellent uſe in vegetation; and when it is reduced by fire to this ſtate, it then takes the name of fixed ſalt, or rather the aſhes of ſalts: the benefit of this calcination to land is manifeſt from the aſhes of burnt vegetables, and other natural bodies reducible to a calx: for the rich principles, or food, if we may call it ſo, of vegetables, are contained more or leſs in all bodies, whoſe parts can be thus

ſeparated,

ſeparated, as is evident from the operations in chemiſtry, which reduce bodies to their component parts, by the help of fire.

Sulphur is a liquid clammy ſubſtance, whoſe parts are ſoon ſeparated, and riſe up into the air with other vapours, and ſoon occaſions violent motions in the atmoſphere, and becomes entombed in the aqueous particles, and is with the rain brough down to the plants. Bitumen is pretty much of the ſame nature with ſulphur, and with it is found in great plenty in moſt bodies, but in the moſt remarkable manner, and in the greateſt quantities, in pit-coal; yet not in equal quantities, as ſome coals burn better than others, and conſequently may contain more or leſs of theſe principles, which are apt to burn. Naptha is a kind of bitumen, and the only difference is, that it takes fire ſooner than bitumen is obſerved to do, and is not ſo eaſily quenched; and this facility of admitting the heating particles, which throw theſe inflammatory bodies into a ſpeedy motion internally, is of great uſe in the different degrees of the plant's growth.

Maltha ſeems to be a ſpecies of naptha; its properties, as they appear to common obſervation, are that if it touches any thing, it ſticks ſo faſt to it, as not eaſily to be ſeparated; and water thrown on it in moderate quantities, does but the more inflame it, and earth alone is able to quench it. This valuable ingredient, when it deſcends in the drops of rain, adheres very intimately to the internal parts of the ſoil, both in the ſuperficies and the concave parts of the pores; and other deſcents of rain increaſe the motion of the internal parts of the particles of maltha, and thereby promote a fine dilatation in the tubular interſtices of the fibres of plants, and duly contribute to the acceleration of that motion in them, which is neceſſary to the different ſtages of their growth and nouriſhment. Before the fine parts of the maltha are in readineſs, or duly prepared by moiſture, and their well regulated fermentation, and while it is waiting for the deſcent of more rain, it is diveſted of all internal motion, and confined as a priſoner, till the other requiſites to the plant's welfare are properly aſſembled, and ready to perform their offices.

Theſe are the chief materials which give motion to plants, and of which the latter are found to conſiſt, when they are analized, unfolded, or ſeparated into their component parts by chemiſtry. The profeſſors of that art call the volatile ſpirits, ſulphur, and ſaline particles, the active principles; becauſe theſe, when duly prepared, and exactly applied to the mouths of the fibres, become the ſole agents, and by their continual motion, cauſe the whole action of the plant.

The vapours thus raiſed from the ſurface of the earth, become the original matter of all meteors, or heterogeneous ſubſtances, fit for the production of the vegetable world; and conſequently an inſtrument in the wiſe appointment of Divine Providence, for the preſervation of man, and all ſubordinate animals. When theſe heterogeneous vapours are thus lifted up above the earth, one degree of cold condenſes them into larger globules, which then becoming ſpecifically heavier than the atmoſphere, fall in drops of rain, and bring down all thoſe treaſures entombed in them. A greater degree of cold produces a coagulation of the heterogeneous vapours, which ſhoot like ſalts into various forms, united into certain angles, and make the flakes of ſnow, which ſtill contain the nutritive principles.

A third, or ſtill greater degree of cold, combines the vapours into a harder ſubſtance, wherein the valuable ingredients are intombed, and they deſcend in what we call hail; but if the cold condenſes the vapours before they riſe high above the ſurface of the earth, they will be unable to aſcend, but will hover about, and fill the lower part of the atmoſphere with what is uſually called a fog, or miſt; and if the cold be ſtill more intenſe, the miſt is frozen to every twig and blade of graſs in form of a white incruſtation, which is called rime. When the air in the day-time is warm, and the vapours buoyed up in it are too fine to be then viſible, they will be condenſed by the coolneſs of the evening, and deſcend on the vegetables in the form of dew: and if the evening of ſuch a fine day be cold enough to freeze, then inſtead of a dew, the ſurface of the ground will be covered with what is commonly called a white froſt. Theſe are the various ways appointed to bring down again upon the earth the treaſures that were taken from it, in order to be prepared and properly ſpread over the globe, by methods and contrivances equally beautiful and ſurprizing; and all this for the ſupply of needy man, who is, when theſe bleſſings are for a conſiderable time with-held from him, turned to deſtruction.

But amongſt the riches of the atmoſphere for the production of vegetables, we muſt not forget the conſequences which the air itſelf is of to them, as we have already obſerved under the article air. *See* AIR. *Randall's Semi-Virgilian Huſbandry.*.

AVENUE, a walk planted on each ſide with trees, leading to an houſe, wood, &c.

The Engliſh elm will do in all grounds, except ſuch as are very wet and ſhallow; and this is preferred to all other trees, becauſe it will bear cutting, heading, or lopping in any manner, better than moſt others. The rough or ſmooth Dutch elm is approved by ſome, becauſe of its quick growth; this is a tree that will bear removing very well; it is alſo green almoſt as ſoon as any plant whatever in ſpring, and continues ſo as long as any, and it makes an incomparable hedge, and is preferable to all other trees for lofty eſpaliers. The lime is valued for its regular growth, and fine ſhade: the horſe cheſnut is proper for all places that are not too much expoſed to rough winds. The common cheſnut will do very well in a good ſoil, and riſes to a conſiderable height, when planted ſomewhat cloſe, though, when it ſtands ſingle, it is rather inclined to ſpread than grow tall. The beech is a beautiful tree, and naturally grows well with us in its wild ſtate, but it is leſs to be choſen for avenues than the before-mentioned, becauſe it does not bear tranſplanting well, but is very ſubject to miſcarry. Laſtly, the abele is fit for any ſoil, and is the quickeſt grower of any foreſt-tree. It ſeldom fails in tranſplanting, and ſucceeds very well in wet ſoils, in which the others are apt to fail. The oak is but little uſed for avenues, becauſe of its ſlow growth.

The old method of planting avenues was with regular rows of trees, and this has been always kept till of late; but we have now a much more magnificent way of planting avenues: this is by ſetting the trees in clumps or platoons, making the opening much wider than before, and placing the clumps of trees about three hundred feet diſtant from one another. In each of theſe clumps there ſhould be planted either ſeven or nine trees; but it is to be obſerved, that this is only to be practiſed

where the avenue is to be of ſome conſiderable length, for, in ſhort walks, this will not appear ſo ſightly as ſingle rows of trees. The avenues made by clumps are fitteſt of all for parks. The trees in each clump ſhould be planted thirty feet aſunder, and a trench ſhould be thrown up round the whole clump, to prevent the deer from coming to the trees to bark them. *Miller's Gard. Dict.*

AVER, a general name for a labouring beaſt of any kind.

AVERAGE, a term uſed by the farmers of many parts of England for the breaking up of corn fields; otherwiſe called eddiſh, or roughings.

AVER-CORN, a name formerly given to the corn conveyed to the lord's granaries by his tenants.

AVER-LAND, the land ploughed by the tenants for the uſe of their lord.

AUGUST, the eighth month of the civil year.

This month returns the countryman's expences into his pockets, and encourages him to another year's adventure. If it proves dry, warm, and free from high winds, it ſaves a great deal of the huſbandman's expence.

You may yet twifallow, alſo lay on your compoſt or ſoil, as well on your lands intended either for barley or wheat.

Carry wood, or other fuel home, before winter approaches, and renders the roads deep and heavy.

Provide good ſeed, and well picked, againſt ſeed-time.

Put your ewes and cows you do not like to fatten.

This is generally the principal harveſt-month for all ſorts of grain, therefore make the beſt uſe of good weather while you have it.

About the end of this month you may mow your after-graſs, and alſo clover, ſaintfoin, and other French graſs. Geld lambs, and make the ſecond return of your fat ſheep and cattle. *Mortimer's Huſbandry, vol.* II.

AUGRE, an inſtrument much uſed by carpenters, wheelwrights, &c. for boring large round holes. It conſiſts of a wooden handle and an iron blade, terminated with a ſteel bit.

A common augre may be very uſefully applied to try the nature of the under ſoil, and layers of earth, in order to know what may be expected from them, with regard to the vegetation of plants. In order to this three augres will be neceſſary; the firſt of them about three feet long; the ſecond ſix; and the third ten. Their diameters ſhould be near an inch, and their bits large, and capable of bringing up part of the ſoil they pierce. An iron handle ſhould be fixed croſs-ways to wring it into the earth; from whence the inſtrument muſt be drawn up, as often as it has pierced a new depth of about ſix inches, in order to cleanſe the bit, and examine the ſoil. But the borer, an inſtrument invented by the marquis de Tourbilli, is much better adapted to this operation. *See the article* BORER.

AVIARY, a place ſet apart for the feeding and propagating birds. An aviary ſhould be ſufficiently large as to allow the birds a conſiderable freedom of flight; and turfed, to avoid the appearance of foulneſs on the floor.

AUMBRY, *Ambry*, or *Aumery*, a pantry, or cupboard to ſet victuals in.

AWMS, the beard of wheat or barley. The word is, in ſome parts of England, pronounced *ails*.

AXIS, or *axle-tree*, of a waggon, cart, &c. is the ſtrong piece of wood or iron, which ſupports the carriage, and round the extremities of which the weels turn. *See the articles* CART *and* WAGGON.

B.

BACK-SINEW, in a horſe, is that ſtrong ſinew extending along the hinder part of the ſhank from the knee to the heel, into which it is inſerted.

The back-ſinew is ſo very ſubject to be hurt or ſtrained, that it is conſidered as one of the moſt common and uſual accidents that happens to a horſe; it generally proceeds from hard riding upon dry grounds, and from other cauſes, where the roads are ſtony and hard, and ſometimes where they are poachy.

It is eaſily perceived by the ſwelling of the ſinew, which ſometimes extends from the knee down to the heel; and when it is ſo, a horſe does not care to ſet his foot even upon the ground; but, for the moſt part, in his ſtanding, ſets it before the other.

The uſual way of curing this malady is with cold charges, which often ſucceed very well, if frequently renewed; ſome uſe curriers ſhavings bound round the knee with a bandage, and this alſo anſwers very well in

ſome caſes; but there is nothing either ſo ready or efficacious as vinegar or verjuice mixed with bole, being often in a day ſoaked well into the ſinew warm; and if any thing of the lameneſs or ſwelling remains after this, and after the heat and inflammation is gone off, a mild blifter, that has nothing corroſive in it beſides the cauſtic ſalt of the flies, will, generally ſpeaking, effectuate a cure, and bring the ſinew fine.

When hot and relaxing oils mixed together are uſed to the back-ſinew, which many practitioners are fond of, becauſe they ſometimes ſucceed in horſes that have their ſinews ſtrong and rigid, yet they are apt to engender wind-galls of a bad kind, or make the veins on each ſide the ſinew to be full and gorged; and horſes have been known to be lame for two or three years together with theſe varixes in the veins. Bliſtering in this caſe has very little or no effect, firing through the vein till the blood comes being only ſufficient to remove that weakneſs. After the firing, the whole leg from the knee down to the heel, and all the hollow places on both ſides, muſt be charged with a good ſtrengthening blifter, which will perfect the cure, eſpecially if the horſe be turned to graſs for a month or five weeks, or, in the winter, if he run a little while in a ſmooth yard, where he has good dry litter. *Gibſon on the Diſeaſes of Horſes.*

BACON, the fleſh of a hog dried in the ſmoke.

A writer in the *Muſeum Ruſticum*, vol. III. pag. 234, has given us the following method of making bacon in Somerſetſhire.

The ſeaſon for killing hogs for bacon is between September and Chriſtmas. When you kill a large hog for bacon, lay the ſides in the ſalting-troughs, and ſprinkle them pretty heavily with bay-ſalt: then leave them twenty-four hours to drain away the blood, and ſome of the over abounding juices.

After this take them out, wipe them very dry, and throw away the draining. Then take ſome freſh bay-ſalt, and heating it well in a large iron frying-pan, rub the meat very well with it; repeating this work every day for four days, and turning the ſides every other day.

If the hog be large, keep the ſides in brine, (turning them ten times) for three weeks; after which take them out, and let them be thoroughly well dried in the uſual manner: if they are not fully dried, they will neither keep ſo well, nor eat ſo fine.

BADGER, the name of an animal, common in many parts of England; and called by ſeveral names, as a gray, a brock, a boreſon, or a bauſon.

Badgers are almoſt as pernicious a creature to the huſbandman as the fox, though not ſo ſubtile, nor can they ſo eaſily catch their prey; but for what they can catch as new fallen lambs, young pigs, and poultry, they are as bad. The way to catch them is with a ſpringe, or a ſteel-trap, or to dig a pit acroſs their path five feet deep, and about four feet long, making it narrow at the top and bottom, and wide in the middle. This muſt be covered with ſome ſmall ſticks and leaves, ſo as that the badger may fall in when he comes upon it. Some hunt them into their holes in a moon-ſhine night, and then dig them out. *Mortimer's Huſbandry, vol.* I. *pag.* 314.

BAG, a name given by farriers to a medicine for recovering a horſe's appetite when loſt. It is done in this manner: they take an ounce of aſſa-fœtida, and an equal quantity of the powder of ſavin; theſe ingredients they put into a bag, which they faſten to the horſe's bits, keeping him bridled for two hours, two or three times a day: as ſoon as the bag is taken off, he will immediately eat. The ſame bag will ſerve a long time.

BAKING *of land.* If ſome ſorts of ſtiff and binding land be ſown dry, and a ſcud of rain falls before the earth has time to ſettle, it is obſerved that the cruſt of ſuch land will bake, ſo that the corn cannot come through, to the great damage of the crop; this evil does not happen if ſuch a ſcud of rain be followed by cool cloudy weather, and not hot ſun-ſhine; for then the earth will not be ſo hollow as to be baked. The beſt way to prevent this is, to roll it immediately after ſowing, which faſtens the earth together, whereby the ſun has not that power of piercing into it, and conſequently not of baking it.

Land of this kind ſhould, therefore, be ſown as often as poſſible with winter corn, ſuch as wheat and vetches; for if wet follows the ſowing, the ſun is not ſtrong enough at that time of the year to ſcorch the ground up, and bind it; and it is obſerved, that this ſort of ground has been always lucky for vetches, probably for the above reaſon. *Liſle's Obſervations in Huſbanary, vol.* I. *pag.* 26.

BALK, a piece of land which has been either caſually overſlipped, or not turned up in ploughing; or carefully left untouched by the plough, for a boundary between lands, or ſome other uſe.

BALK, alſo ſignifies the ſummer-beam, or dorman of a houſe.

BALKS, or *bawks*, implies poles laid over a ſtable, or other building, for a roof.

BALM. *See the article* BAUM.

BANDS, a ſmall parcel of the longeſt wheat taken from the grips, and twiſted together at the ear-ends, for binding the wheat into ſheaves.

The bands ſhould be laid in the morning, that they may not crack; for the ſtraw will not twiſt after the ſun is up, but will be brittle, and break off below the ears. The turning of three or four of the ſtubble or bottom ends of the ſtraw to the ears of the band, helps greatly to add to its ſtrength and toughneſs.

The bands for binding up the ſheaves ſhould not be ſpread but in fair weather, becauſe being dreſſed down by the grip or two which it is neceſſary to lay upon them to keep them in their places, and prevent their being untwiſted by the ſun, they will grow ſooner than any other part of the corn, if rain ſhould come; for they cannot dry on account of their lying undermoſt. But though the bands muſt always be made while the morning dew is upon them, the ſheaves ought by no means to be bound up wet: if they are, they will certainly grow mouldy.

Farmers do not always attend ſufficiently to the binding up of their ſheaves, but ſuffer the reapers, for diſpatch, to tie the bands juſt underneath their ears; inſtead of binding them at the other end; the conſequence of which is, that they will hardly hold together to be flung into the cart, and will certainly be in great danger of falling to pieces before they are thraſhed.

If a little rain be foreſeen in harveſt time, it is beſt to bind the grips into ſheaves as faſt as they are made; becauſe ſmall ſhowers will wet the ſingle grips ſo much, that they cannot be bound up, and theſe ſhowers may be the

the fore-runners of greater rains. The ſheaves being bound will ſoon dry after ſuch wet. But if a hard rain is foreſeen, the beſt method is not to bind the wheat into ſheaves, becauſe they will then be wet to the bands, and muſt be opened again. Mr. Liſle tells us, that one of his neighbours to whom this happened, unſheafed ſome of his wheat to dry it, and opened it and turned it ſo often, that the ears broke off, whereby he loſt half his corn; caution therefore ought to be uſed in this caſe, leſt by curing one evil we create a worſe. *Liſle's Obſervations in Huſbandry, vol.* I. *pag* 333.

BANDS *of a ſaddle* are two pieces of iron, flat, and three fingers broad, nailed upon the bows of a ſaddle, one on each ſide, contrived to hold the bows in the ſituation that makes the form of a ſaddle.

BANE, in ſheep, the ſame as rot. *See the article* ROT.

BANGLE-EARS, an imperfection in a horſe, which may be remedied in the following manner: place his ears as you would have them ſtand, and then with two little boards, or pieces of trenchers, three fingers broad, having two long ſtrings faſtened to them, bind the ears, ſo faſt in the places where they ſtand, that they cannot ſtir; then behind the head, and the root of the ears, you will ſee a great deal of empty, wrinkled ſkin, which you muſt pull up with your finger and thumb, and clip away with a pair of ſharp ſciſſars all the empty ſkin cloſe by the head; then with a needle and red ſilk, ſtitch the two outſides of the ſkin together, and heal the wound with a mixture of honey and turpentine: when this is done, take away the ſplints that hold up the ears, and in a little time they will keep the place where you fixed them without alteration.

BANK, a heap of earth piled up to keep out the water of a river, lake, or the ſea.

Sloping banks are the beſt ſecurity againſt the encroachments of the ſea, of rivers, or of lakes; making proper allowance for the weight of water, and violence of the waves. Theſe banks ſhould be raiſed about two feet above the level of the water at the higheſt tides, and their ſtrength ſhould be proportioned to the force of the water intended to be fenced off. When a river is too much confined, it ſwells conſiderably upon a flood, and conſequently requires banks of greater height and ſtrength than would otherwiſe be neceſſary: though it will ſometimes break even theſe, and carry all before it, if a ſufficient ſpace be not allowed for the increaſe of its water: but when ſuch a ſpace is left, the waters ſpread, and ſeldom riſe more than two or three feet above their uſual level. In ſome caſes a breadth of fifteen or eighteen feet on each ſide may do; but in others, fifty, eighty, or an hundred feet, or perhaps ſo many yards, according to the largeneſs of the river, muſt be left open for that purpoſe. It is beſt to err on the ſafe ſide; eſpecially as the ground that is left between the banks and the river will be far from being loſt; for it will afford good grazing in the dry ſeaſons of the year, and may be planted with oſiers, and willows, and other trees of that kind; but theſe ſhould never be planted upon the banks, leſt the winds ſpoil and tear them, by ſhaking the trees, and looſening their roots.

In the iſle of Ely, it is common to ſee great banks diſtant one or two hundred yards on each ſide from the channel of the river; and when they are ſo made, they are always ſafe: but where the diſtance between the banks is narrow, there, and there only, the banks are in danger of being broken down, and the country of being overflowed.

If a conſiderable body of water is to be guarded againſt, dig a trench ten or twelve feet wide, and two or three deep, or more, according to the height of the bank required. Lay all the ſoil that is taken out of this trench, on that ſide of it which lies towards the water, and leave a ſpace of two or three feet between the trench, and the foot of the bank. Let the bank be made with an eaſy ſlope of fifteen or eighteen feet in length towards the water, allowing the ſlope two and a half, or three feet fall to one in height; but the inſide ſlope need not be more than eight or nine feet, which is a foot and a half ſlope to one foot perpendicular. The bank thus raiſed five or ſix feet high, according as the floods require, will be two feet wide at the top, where it ſhould be well flatted, that people may walk upon it. Let it then be covered with gravel dug out of the channel of the water, by which means the river will be deepened, and the bank rendered ſtronger; and to add to the latter, ſow it very thick with graſs-ſeed. This will be found much better than turfing it with the ſods taken from off the trench, or ſome neighbouring ground; becauſe the ſods are apt to ſhrink, open, and part from one another in dry weather, and are then liable to be waſhed away with the next flood; whereas in this much cheaper way, a cloſe covering of graſs, even long enough to mow, will be formed in a month or two: far fitter than ſods to break the ſurface of the bank; for any tolerable ſoil may be very ſoon brought to have a coat of graſs, by only raking it fine, and ſowing it with graſs ſeeds. In a week or ten days in the ſpring, or ſummer, the graſs will be up, and grow to ſuch a height in a month or ſix weeks, as to be fit for mowing.

Some have attempted to guard againſt inundations by building walls of ſtone and lime, where the materials are in plenty. The great danger here is their being undermined, and that chiefly by the water's ſtriking with force againſt the bottom, upon meeting with reſiſtance from the wall. But this may be eaſily guarded againſt by laying a row of flat ſtones lower than the bottom of the river; for the water ſtriking againſt theſe ſtones, turns off without any danger to the foundation.

The broad trench within the bank, beſides affording materials for making the bank and ſlopes, is attended with the farther advantage of ſerving for a drain to the inland ground. Theſe trenches ſhould always be carried as far as the banks, particularly when theſe are intended to fence off a riſing tide; and in the loweſt part of the ground a ſluice with a valve, flap-door, or flood-gate ſhould be placed in the bank, where it will both diſcharge the inland water, when the tide is out, and prevent its flowing in. The ſeaſon of the year freeſt from floods ſhould be choſen for making theſe banks, that the bank may have time to ſettle and grow firm before the heavy rains come on. It is alſo adviſable to be as expeditious as poſſible in this work. For if it be begun in a dry ſummer, and finiſhed in a month or two, there will be little danger of being interrupted by extraordinary floods or violent ſtorms, either of which might do more harm in one day, than could be repaired in a fortnight.

The exact dimenſions of the bank, and of the ditch within it, cannot be preciſely aſcertained by any general rule; becauſe both tides and floods riſe to different heights, and have different force in different places and circumſtances. The ſtrength above-mentioned may be ſufficient for banks in common caſes; but in others, where a great body of water, or a powerful tide is to be oppoſed, they may be, as the memoirs of the Berne Society (*tom.* II. *part* II. *pag.* 262) adviſe, four feet or more wide at the top, with a baſis proportioned to their height, as three and a half are to one; or, if it be deſired to make them ſtill more ſolid, as four to one; ſo that if the bank be four feet and a half high, its baſis in the former caſe will be fourteen feet wide, and in the latter eighteen.

The Dublin ſociety for the advancement of agriculture informs us (Numb. XVII. *for April* 1737) that "Lord Limerick has recovered between four and five hundred acres of very rich ſalt-marſh, at Dundalk in Ireland, and effectually ſecured them from the ſea, by ſuch banks as are above deſcribed; and by the ſame method many hundred thouſand acres have been recovered from the ſea in Cambridgeſhire, Lincolnſhire, and other parts of England; not to mention the low lands of Holland; which are indeed ſecured againſt the violence of the ſea by no other means.

"If there be a neceſſity for making banks on a ſtrand where nothing but ſand can be met with, thoſe banks ſhould be large, and the ſlope very broad and extended; and if graſs-ſeed will not grow on them, let ſea-weeds be planted. Theſe with ſticking furze, ſtraw, or lopping of trees, will help to keep the banks together."

But a better method, and more effectual, is given by Dr. Hales in the Philoſophical Tranſactions, from the experience of Dr. Wark, a clergyman in Scotland. The method conſiſts in fixing to the bottom of the channel, a breadth of furze proportioned to the force it is to reſiſt. The ſand or ſlime, as either abounds, will ſoon ſettle among the branches of the furze; and when the firſt bed of the furze is thus interwoven or covered, another bed of furze is to be laid on as before, and ſo on, till the bank is raiſed to a ſufficient height. Dr. Wark aſſures us, that by this ſimple method a bank was made near Holy-iſland ſo ſtrong, that it became a bar againſt the ſea itſelf.

"It ſometimes happens, that the ſea flows in through a narrow gut or paſſage, by which the inland waters are diſcharged, and then extends itſelf, and covers a great deal of ground. When this happens, if the inland waters cannot be diverted into another courſe, ſince a paſſage muſt be left for their diſcharge; let a ſtrong ſluice be fixed in the loweſt part of the channel, with large piers of ſtone, running out for its ſupport, and a ſtrong foundation of wood or broad ſtones for the water to run over. When this is done, let the banks of ſand, or other ſoil near at hand, be made in the manner already mentioned on each ſide of the ſluice.

"The reaſon why it is adviſed, in places where a ſluice is to be made, to begin the work by this rather than by the bank, is, that while the tides have liberty to flow in and out at a great breadth, the ſluice may be made in any part of the channel without being much incommoded by the tide; whereas if it be deferred till the banks on each ſide are made, the force of the tide, when confined to a narrow paſſage, will tear up all before it, and render the building of the ſluice impracticable: and upon the ſame account, the banks ſhould be begun at the loweſt part of the channel, and carried on from thence to the upper grounds.

"If, by any accident, the waters ſhould ſwell ſo high as to overflow and tear the banks, farther miſchief may be prevented by fixing with all expedition, a ſail-cloath, or ſheet of linen at the bottom of the bank, where the flood breaks in; for if this be done in time, the water will flow over the cloth, without waſhing away the bank.

"In every improvement, the expence ſhould be particularly conſidered. That of making banks in this method is ſmall. In low grounds the ſoil is ſoft, and dug with eaſe, and all the work may be done with the ſpade and ſhovel, without pick-axes, which muſt be uſed in upland ground, and the materials are on the ſpot. All the charge will be often more than repaid by the firſt years improved crop of graſs, and the ſafety of the meadows. The produce of ſucceeding years will amount much higher, and the huſbandman will be out of all danger for the future of having his lands overflowed and ſpoiled. Farmers have frequently ſuſtained more damage from the hay deſtroyed in one ſeaſon by floods, than the whole value of what it would have coſt them to incloſe and bank their meadows, and free them from all hazards."

BANNOCK, an oat-cake kneaded with water only, and baked in the embers.

BANQUET, in that ſmall part of the branch of the bridle that is under the eye, which being rounded like a ſmall rod, gathers and joins the extremities of the bit to the branch, and that in ſuch a manner, that the banquet is not ſeen, but covered by the cap, or that part of the bit which is next the branch.

To BAR *a vein*, implies an operation in farriery performed in the following manner: they open the ſkin above and below the place where the operation is to be performed, and after freeing the vein from the ſurrounding parts, they tie it at thoſe openings with two ligatures; after which they open the vein between the ligatures in order to diſcharge the blood. This operation is performed upon the veins of a horſe's leg, and other parts of his body, in order to ſtop the courſe, and leſſen the quantity of malignant humours that prevail there.

BARB, a general name for horſes imported from Barbary.

The cheſt of the barb is long and ſlender, riſes beautifully from the withers, his mane little, his head well ſhaped, ſmall, and lean; his ſhoulders flat and ſlender; his withers narrow and plump; his back ſtrait and ſhort; his flanks and ſides round, and not bellying out; his haunches firm and well ſhaped; his croop generally ſomewhat long, and his tail placed pretty high; his thigh well ſhaped, and ſeldom flat; his leg handſome, well ſhaped, and without long hair at the paſtern joint; his foot well made, but his paſtern often long.

Barbs are of all colours, but generally brown. They are ſomething negligent in their goings; but, properly encouraged, ſhew an amazing ſwiftneſs and vigour; they are very light and fit for running; and ſeem of all others the fitteſt to breed from. It were, however, to be wiſhed that they were a little taller, the largeſt barely exceeding fourteen hands; and one of fourteen hands

and an inch, is very extraordinary. Experience has, however, ſhewn, that in England, France, &c. they get colts larger than themſelves. Among the barbs, thoſe from the kingdom of Moroco are accounted the beſt, except the mountain barbs. Thoſe of the reſt of Mauritania, are inferior to them, as are alſo thoſe of Turkey, Perſia, and Armenia. All horſes from a hot climate have a ſmoother coat than others. *Buffon's Hiſtoire Naturelle, tom.* IV.

BARBELS, or *barbs*, are excreſſences or knots of ſuperfluous fleſh, growing under the tongue, and may be ſeen by drawing it aſide.

They are cured by cutting them cloſe off, and waſhing the wounded part with brandy, or ſalt and water. *Bartlet's Farriery, pag.* 262.

BARBS. *See the article* BARBELS.

BARG, a horſe-way up a ſteep hill.

BARING *of trees. See the article* ABLAQUEATION.

BARK, the exterior part of trees, ſerving them for a ſkin or covering.

Dr. Agricola ſays, that the bark of a tree may be compared to the ſkin of an animal, which is deſigned for the preſervation of the inward parts. It is generally of a ſpongy texture, and communicates with the pith, by a multiplicity of ſmall fibres paſſing between the capillary tubes, of which the wood conſiſts; ſo that the roots having imbibed the proper nutriment of the tree, is is carried up by the warmth of the ſun, through the fine arterial veſſels of the tree to the top of it; and being there condenſed by the cold, it returns by its own gravity down by the veſſels which lie between the wood and the inner bark, which perform the office of veins; and as it paſſes by leaves ſuch part of its juices as the texture of the bark will receive, and requires for its ſupport.

Some are of opinion, that the ſoft whitiſh rind, or ſubſtance which lies between the inner bark and the wood, performs the office of veins; and ſome call this a third bark, ſuppoſing it to differ from the other only in having its fibres cloſer; adding that this is the part which contains the liquid ſap, gums, &c. found in plants during the ſpring and ſummer months, and which hardening by degrees, is imperceptibly conveyed into the woody part of the tree, forming every year a new circle of wood between the bark and the trunk. Theſe circles are not equally thick, that circumſtance depending on the fertility of the year.

The bark of trees in general, and eſpecially that of the oak, contains a very rich ſalt, extremely uſeful in vegetation. One load of oak bark laid in a heap and rotted, after the tanners have uſed it for dreſſing their leather, will do more ſervice to ſtiff cold land, and its effects will laſt longer, than two loads of the richeſt dung. Mr. Miller ſays it is much better for cold, ſtrong land, than for light, hot ground, if it be uſed alone, as taken from the tan-yard; becauſe it is of a warm nature, and will looſen and ſeparate the earth ſo effectually, that, by only uſing it two or three times, a ſtrong ſoil, not eaſy to be wrought, will be rendered perfectly light and looſe: but by mixing it with earth of a nature contrary to that which it is intended to correct, and in a proportion ſuited to the nature of the ſoil it is to be laid on, it will prove a fine manure for almoſt any land; its ſalts being ſuch as will always fertilize the ground. Mr. Mortimer aſſerts, that it will alter and change the very nature of the ſoil, and turn it into a very rich black mould. *Mortimer's Huſbandry, vol.* I. *p.* 121.

It neceſſarily abounds in vegetable parts, derived from the tree to which it once belonged; and cannot but be ſtrongly impregnated with animal juices, as it lies a long time in the tan-vats, with the ſkins and hides of animals; circumſtances which muſt render it ſingularly beneficial to all poor lands.

If laid on graſs, it ſhould be ſpread ſoon after Michaelmas, that the winter rains may waſh it into the ground: for if it be laid on in the ſpring, it will be apt to burn the graſs, and, inſtead of improving, will do it a conſiderable injury for that ſeaſon. When uſed for corn land it ſhould be ſpread before the laſt ploughing, that it may be turned down for the fibres of the corn to reach it in the ſpring; for if it lies too near the ſurface it will forward the growth of the corn in winter; and in the ſpring, when the nouriſhment is chiefly wanted to encourage the growth of the plants, it will be ſo nearly conſumed, that the corn will receive very little advantage from it.

Mr. Bradley tells us, that he adviſed a gentleman to whom a conſiderable quantity of bark was left upon the expiration of the leaſe of a tan-yard, to lay ſome of it upon a piece of ſtubborn ſour land, which he did with ſuch ſucceſs, that his product was admired by all the gardeners and farmers in the neighbourhood. For ſuch ground, he thinks it ſhould be mixed with a ſandy ſoil; and that one third of bark to two thirds of ſand, will be a very ſufficient proportion for clays; laying on about one hundred and fifty cart loads upon an acre. *Bradley's Huſbandry, pag.* 90.

All barks or rinds of trees, though not of ſo high a value as that of the oak, which is the ſort principally uſed by tanners, muſt of neceſſity enrich either corn or paſture ground, if broken into ſmall pieces, and laid upon it. They muſt needs be much richer than the mould or earth, uſually found in the bodies of old, large, hollow, willow-trees, though this is juſtly eſteemed very efficacious. *Worlidge's Huſbandry, pag.* 84.

For the manner of making hot-beds with tanner's bark, *ſee the article* TAN.

BARK-BOUND, a diſeaſe common to fruit-trees, and may be cured by making a ſlit through the bark, from the top of the tree to the bottom, in February or March; and if the gaping be pretty conſiderable, fill up the rift with cow-dung. *Mortimer's Huſbandry, vol.* II. *pag.* 85.

BARKING *of trees*, the operation of ſtripping off the bark or rind, particularly that of the oak, for the uſe of tanners.

It is neceſſary in our climate to perform this operation in the month of May, becauſe at that ſeaſon only, the bark is, by the great quantity of ſap, eaſily ſeparated from the wood. This alſo renders it neceſſary to fell the trees in that month; but by this method the timber is much leſs valuable than it would be if felled after the fall of the leaf.

BARLEY, a ſpecies of grain well known in England, and of which Mr. Miller has enumerated four ſpecies.

1. The ſpring barley, which has a double row of beards or awms ſtanding erect. This is the ſort princi-

pally

pally cultivated in England, and of which the farmers make two ſorts, viz. the common, and the rath-ripe barley: but theſe two ſorts are in reality the ſame; for the rath-ripe is only an alteration of the common barley, occaſioned by being long cultivated upon warm gravelly lands. The ſeeds of this, when ſown in cold or ſtrong land, will, the firſt year, ripen near a fortnight earlier than the ſeeds taken from ſtrong land, and therefore the farmers in the vales generally purchaſe their ſeed barley from the warm lands; for if ſaved in the vales two or three years, it will become full as late in ripening as the common barley of their own product: on the other hand, the farmers on the warm land are alſo obliged to procure their ſeed barley from the ſtrong land, otherwiſe their grain would degenerate in bulk or fulneſs, which, by this change, is prevented. This ſort of barley is eaſily diſtinguiſhed by the two orders of beards or awms, which ſtand erect; the rind is alſo much thinner, and therefore eſteemed better for making malt.

2. The long eared barley, which is cultivated in many parts of England, and is an exceeding good ſort; but ſome farmers object to this barley, becauſe they ſay the ears being long and heavy, it is more apt to lodge. This ſort of barley hath its grains regularly ranged in a double row, lying over each other, like the tiles on a houſe, or the ſcales of fiſh. It has no beards or awms; but its rind is very thin, and therefore eſteemed for making malt.

3. The ſprat barley, called alſo Battledore, Fulham, and Putney barley, from the great quantities cultivated in the neighbourhoods of thoſe places, has ſhorter and broader ears than either of the former ſorts; the awms or beards are longer, which tend greatly to preſerve it from the birds, and the grains placed cloſer together. This ſeldom grows ſo tall as the other ſpecies; the ſtraw is alſo coarſer, and therefore not ſo good fodder for cattle.

4. The winter barley, called alſo ſquare-barley, bear-barley, or big, is ſeldom cultivated in the ſouthern parts of England; but in the northern counties, and in Scotland it is the general ſort ſown, as being much hardier than the other ſpecies. There are two ſorts of this barley, the one with four rows of grains, and the other with ſix, the latter of which is commonly diſtinguiſhed by the name of barley-big. The grain is large and plump, but the rind or chaff of it being thicker than that of either of the preceding ſorts, it is leſs eſteemed for maing malt, and therefore not cultivated in the ſouthern parts of England, where the ſorts which are ſo much better for that purpoſe thrive ſo well.

Both the four and ſix rowed barley are generally ſown in the autumn, nearly at the ſame time with wheat, not only in temperate climates, but alſo in a very cold countries: their hardineſs being ſuch as to bear the winter's froſts, even in the mountainous parts of the northern regions. In hot countries they are ſown in January, February, and March.

All the other ſorts are ſown in the ſpring of the year in a dry time; in ſome very light land, barley is ſown early in March, but, in ſtrong clay ſoils, not till April, and ſometimes not till the beginning of May; but when it is ſown ſo late, if the ſeaſon does not prove very favourable, it is very late in autumn before it is fit to mow, unleſs it be the rath-ripe ſort, which is often ripe in nine weeks from the time of ſowing: though Mr. Liſle is of opinion, that this, in particular, ought to be ſown early, for otherwiſe it will grow very thin. He likewiſe thinks that it ſhould be ſown on better ground than the other barley, becauſe as it ripens in a ſhorter time it may be naturally ſuppoſed to exhauſt the nutritive juices of the earth faſter than other corn. But it is ſaid by others, that theſe nutritive juices in almoſt any tolerable ſoil, will probably hold out long enough to feed a crop of ſo ſhort a ſtanding as this is, though they might not ſuffice for corn which ſhould remain longer upon the ground; and it is added, that about Patney in Wiltſhire, they ſow the pooreſt ſandy ground with rath-ripe barley. *Liſle's Huſbandry, vol.* I. *pag.* 271.

Mr. Liſle adds, that he himſelf in the year 1707, ſowed in Hampſhire, rath-ripe barley in very poor white ground, and ſome of the ſame corn in good ſtrong clay land. No rain fell to bring it up till June; after which there were frequent ſhowers, and plenty of rain till harveſt. His rath-ripe barley in the poor land was miſerably bent, broken in the ſtraw, and harled, or fallen down. In the ſtrong clay land, the ſame corn ſuffered the ſame injuries, though in a leſs degree: but the ſtraw and leaves of the rath-ripe barley in both places blighted, and were full of black ſpecks; their ears were thin, and their colour was loſt; while the plants of late-ripe barley in an adjacent field were free from theſe ſpots, and ſtood upright with good ſtrength. From this experiment he infers, that ſince the clay land in the hilly country of Hampſhire, though in good heart, cannot even, in a moiſt year, ſufficiently feed the ſtraw of rath-ripe barley, ſo as to enable it to ſtand upright, but ſuffers it to be languid and withering, this ſort of corn is not proper for ſuch places, and that it is better to ſow late-ripe barley, even though three or four horſes extraordinary be provided againſt ſowing time, in order to get the corn into the ground a week before May begins. *Liſle's Huſbandry, vol.* I. *pag.* 272.

Another important obſervation made on the ſame occaſion, by the ſame judicious farmer, was, that one half of the ſeed which fell deep came up without rain, while the reſt did not ſprout till after the rain came. The half which came up firſt, could not, by reaſon of the weakneſs of the ſtems, wait for the ripening of the latter edge-grown corn, in the ſame field; but its ſtraw bent, broke, and was entangled, and the ears buried themſelves among the broad clover ſown with the barley, ſo that he was forced to cut it, not being able to ſtay a week or ten days longer for the edge-grown corn to ripen: whereas the late-ripe barley ſtood ſo upright in its ſtraw, that the corn which came up firſt would ſtay ten days for the edge-grown corn.

The ſame gentleman had another evident proof, in the year 1706, that the ſtraw of the rath-ripe barley is thinner and weaker than that of the late-ripe. All his rath-ripe barley, of which he ſowed fifty acres in different ſorts of ground, and ſome of it ſide by ſide with late-ripe barley, crumpled down in the ſtraw, while the late-ripe barley of the ſame forwardneſs and growth, ſtood upright.

Upon the whole, Mr. Liſle, after obſerving farther, that, if the ground be good, and the year a feeding one, rath-ripe barley is apt to run rank, and to fall while very green in the ear, which occaſions the grain not to fill; concludes, in regard to this ſort of corn, that it

ſhould

ſhould always be ſown early, that the land ſhould not have a north expoſure, and that the ſoil in which it is planted ſhould be pretty good, either naturally ſuch, or rendered ſo by art; "for we know, ſays he, that the poorer the ground is, the weaker and poorer the ſtraw will be in all ſorts of corn; and if the rath-ripe barley has by nature a weaker and thinner ſtraw than the late-ripe barley, and on that account is apter to crumple, to bend down, and to break in the ſtraw before it is ripe, much more will it be apt to do ſo, when the ſtraw is made much thinner and weaker than naturally it would be by the poverty of the ground it is ſown in. It is very evident to me, that rath-ripe barley ought not to be ſown on poor ground, and much leſs ſo in caſe it lies declivous from the ſun towards the north." *Liſle's Huſbandry, vol.* I. *p.* 273, 274.

"Common barley ſown once in the burning ſand at Patney in Wiltſhire, will, for many years after, if ſown on indifferent warm ground, be ripe two or three weeks ſooner than any other, which has never been impregnated at Patney: but if ſown a degree farther north, on cold clayey land, will, in two or three years, loſe this quality, and become as late-ripe as any other. Indeed, Patney is far from improving the ſpecies of barley, except we think it improved by becoming more weak and tender, and ſhorter lived; which laſt mentioned quality fits it for ſuch countries, where the ſummers are too ſhort for other barley to ripen.

Barley is far from being improved by becoming rath-ripe; for it loſes more good qualities than it gets by being ſown at Patney. It is ſo tender, that if it be ſown early, the froſt is apt to kill it: or if it be ſown late in May, on the ſame day, and in the ſame ſoil, with the ſame ſort of barley that is not rath-ripe, it will be much thinner bodied than the late-ripe. And beſides, if it happens to have any check, by cold or drought, it never recovers it, as the other doth, at what time ſoever it is ſown. It is now, as I am informed, gone out of faſhion, and very few farmers have ſown it of late years.

I know a little pariſh, that I believe formerly loſt about two hundred pounds a year, by ſowing rath-ripe barley. But long and dear experience hath now convinced them of their error, and obliged them totally to diſuſe it." *Tull's Huſbandry, pag.* 115, 233 *and* 234.

The middle-ripe barley, as Mr. Liſle calls it, meaning the common ſpring barley, bears late ſowing, even upon ground declivous from the ſun, better than the rath-ripe ſort; but not near ſo well as the late-ripe, or common long eared barley; nor will its ſtalk ſtand ſo long. Mr. Liſle was convinced from experience, that late-ripe barley will endure being ſowed when the ground is wetter than will do for the rath-ripe ſort, and that a bottom ground, or vale pent in between two hills, though ſhaded by one of them from the ſun, will, by means of the warmth and cloſeneſs of the air, often ripen corn as faſt as the ground that lies declivous to the ſun. In a field which he ſowed with the common ſpring barley, the loweſt part of which laid on a flat, ripened regularly, and even ſooner than another part of the ſame field which lay upon the ſide of a hill declivous to the ſun: but on that ſide of the ſame hill which ſloped from the ſun, the corn was more edge-grown, lay backward, and neither looked ſo white, nor was it ſo ripe. *Liſle's Huſbandry, vol.* I. *p.* 275.

The land which lies both very dry and healthy, and in which both mellowneſs and lightneſs are joined to a proper ſtrength of ſoil, is that which produces the beſt body, and thinneſt rinded barley; qualities which always recommend this grain, eſpecially to the maltſters. Such generally is the barley of the growth of the hilly countries. But poverty of ſoil is by no means requiſite in land, in order to its producing a plump and thin rinded barley; though it is allowed, that poor land which lies dry and warm, will bear better corn of this kind, than rich land in a cold and wet ſituation; for barley does not ſtand ſo much in need of ſtrength in the land, as of the healthineſs and warmneſs of the ſoil; though both are beſt where they can be had. *Liſle's Huſb. vol.* I. *p.* 281.

With regard to the choice of ſeed barley, it is neceſſary to obſerve, that the beſt grain for ſowing is that which is not blackiſh at the tail, nor has a deep redneſs, but is of a pale lively yellow colour, intermixed with a bright whitiſh caſt, and if the rind be a little ſhrivelled, it will be ſo much the better; for that ſlight ſhrivelling occaſioned by its having ſweated in the mow, is a ſure indication that its coat is thin. The huſk of thick rind barley being too ſtiff to ſhrink, will lie ſmooth and hollow, even when the inſide flour has ſhrunk from it.

The neceſſity of a change of ſeed from time to time, by ſowing that of the growth of a different ſoil, is no where more evident than in the culture of this grain, which otherwiſe becomes coarſer and coarſer every year. But at all times in this, as well as in all other grain, the utmoſt care ſhould be taken that the ſeed be full bodied.

Mr. Liſle tells us, that in order to be ſatisfied of this, he took out of a heap of barley ſixty grains, of different ſizes, viz. twenty of the biggeſt, twenty of the middle ſize, and twenty of the ſmalleſt corns. Twenty of each ſort of theſe grains he planted in three pots, each filled with the ſame ſort of mould, which was very rich. In eight or nine days time thirteen of the fulleſt bodied grains were come up, nine of the middle ſized, and only five of the ſmalleſt, and the plants of the plumpeſt corn exceeded thoſe of the others, both in colour and breadth of blade. In three days after, he found nineteen blades of the largeſt ſort come up, ſeventeen of the middle ſize, and thirteen of the ſmalleſt; and in three days more, the blades of the beſt and of the middle ſort were all come up, while only ſeventeen of the worſt had ſprouted, with ſuch manifeſt diſadvantage in colour and ſtrength in theſe laſt, as plainly ſhewed that many of them would not have come up at all in poor ground. *Liſle's Huſband. vol.* I. *p.* 283.

It is natural to ſuppoſe that barley will, like wheat, be benefited by being ſteeped before it be ſown; for as rain cannot be depended upon ſoon after the ſowing of ſpring corn, there is ſurely an equal reaſon for extending the practice of theſe ſorts of grain, as well as to thoſe which are ſown in the autumn. Liming indeed may hurt barley, if hot weather ſhould ſoon follow after the ſowing, but a little ſprinkling of ſoot bids fair for improving it, at leaſt it will prevent the inſects from preying upon the ſeed. The Rev. Mr. Elliot informs us, that a farmer who was obliged to attend other buſineſs in the courſe of the morning, ſowed oats at break of day, and harrowed them in before ſun-riſing. The conſequence was, that the corn thus early ſown, out-ſtriped the other oats ſown on the

ſame day after the ſun was up, had larger ears, and appeared every way better, though the ſpot in which they grew was the worſt part of the field. If the dew, when buried with the corn had this effect, it is reaſonable to ſuppoſe that a much greater would have been produced, had the ſeed been ſown in the evening, left all night to have been ſoftened with the dew, and then harrowed in in the morning. *Elliot's Eſſay on Field Huſbandry, p.* 29.

Mr. Liſle alſo tells us, that a maltſter in Hampſhire having taken lands in the beginning of May, and no barley being to be had, he, by the perſuaſion of his malting-ſervant, made uſe of barley he had wetted, and was juſt well chitted or ſprouted; this corn came up well, and produced as good a crop as any ſown that year. *Liſle's Huſbandry, vol.* I. *p.* 284.

Barley is generally ſown either after a fallow, or on an erſh or ſecond crop. If after a fallow, the land muſt be ploughed at leaſt three times; and at the firſt ploughing, it ſhould be laid in ſmall ridges, and in that manner remain during the winter for the froſt to mellow it: but if another ploughing can be given it in January, or in the beginning of February, the ground will be ſtill much better broken and prepared. In March theſe ridges are ſplit, the ground is well harrowed, and laid as ſmooth as can be, and, if poſſible it is plowed again the ſame day, in order to ſow. But in ſtrong wet lands, the beſt way is to lay it round, and make deep furrows to receive the water.

Some at the time of twifallowing in June, make the land very fine, and ſow it with turneps, which they feed with ſheep in the winter; and in March they plough it up, and order it as before; but others who take this method of ſowing turneps, give it only one ploughing in March, juſt before they ſow.

Thoſe who ſow barley upon an erſh, after wheat, plough up the wheat ſtubble in as dry weather as they can, as ſoon as the time of ſowing wheat is over, which is generally about the beginning of October, and lay three ridges into one, if they have dung to ſpread upon it: but if they have not, they plough it in ſmall ridges, as before directed, that it may be the drier, and be the better mellowed by the froſt: they then plough it up again in March, and order it as before. Some farmers injudiciouſly ſow their barley after oats, in which caſe, neither of theſe three ploughings ought by any means to be neglected; and the land will be in much better order if the firſt of them be given in October: or, if the harveſt be early, the weather dry, and the huſbandman can poſſibly find time to do it, he will improve his ground ſtill more, by ploughing it up before he ſows his wheat, juſt as harveſt is in: this will be half as good as a ſummer's fallow. But all years will not admit of this practice. *Mortimer's Huſtandry, vol.* I. *p.* 131.

Some ſow their barley on ſmall ridges, and others on broad lands; the latter cannot be laid too round.

Mr. Mortimer relates, that a farmer in Eſſex, who lived near a market-town, from whence he had good quantities of dung, uſed to ſow his land with barley and clover; reaped the corn at harveſt, fed the clover all the winter, and from ſpring till the middle of July, when he fallowed his ground. In the next ſpring he ſowed it again with barley and clover, and repeated every year this method, by which he had large crops. His land was a rich light mould, ſomewhat inclining to a gravelly bottom. *Mortimer's Huſbandry, vol.* I. *p.* 132.

A correſpondent of the editors of the *Muſeum Ruſticum*, obſerves, that a few years ago he ſowed twenty-five acres of land, in fine tilth, with broad clover and barley; but the ſpring being backward and cold, and the ſummer wet, the clover got too forward, and overpowered the barley. At harveſt they were both cut together; and the clover being full of juice, occaſioned its being a tedious time before the barley could be houſed. When he got it into the barn, the men complained much of its threſhing ſo badly, that they could not undertake to do it unleſs he would double the price to them: as this could not be afforded, he ordered them to give it only a light beating, leaving the under corn in the ſtraw, together with the clover, for the cattle.

By this means he loſt half his crop by the clover; and what barley could be obtained was lean, and thin-bodied, fetching but a very indifferent price at market.

As this was not the firſt loſs of the ſame kind he had experienced, he was determined, if poſſible, to find out ſome remedy; and accordingly applied to a very intelligent farmer in the neighbourhood, who adviſed him to ſow his clover, for the future, a month after the barley, by which means it would not prove too rank. This advice he accordingly followed, and found it anſwer extremely well; and has therefore, to his great advantage, continued the practice ever ſince. He adds, that there is no danger of the clover failing, though the ſeaſon ſhould prove dry; and that the ſeed is to be ſcattered on the ground without any farther care, there being no occaſion to harrow or roll it; for the ſmall blades of the barley will keep moiſture enough in the land to ſupply the ſmall wants of the clover during its infant growth, and when the barley will is off, it thrive ſurprizingly. *Muſeum Ruſticum vol.* III. *p.* 315.

It has been already obſerved, that the uſual time of ſowing is in March, April, or the beginning of May. It is generally thought moſt adviſeable to ſow light lands the earlieſt, and to embrace the firſt dry ſeaſon that offers for doing it, dry weather being beſt for moſt ſummer corn. Clayey grounds, and lands ſubject to weeds, are thought to produce the beſt crops when ſowed late. Mr. Mortimer ſays, that barley will do well when ſown even about the middle of May, if the ſeed has been properly ſteeped. *Mortimer's Huſb. vol.* I. *p.* 132.

The common method is to ſow the barley ſeed with a broad-caſt at two ſowings; the firſt being harrowed in once, the ſecond is harrowed until the ſeed is buried; the common allowance of ſeed is four buſhels to an acre: but if the farmers could be prevailed upon to alter this practice, they would ſoon find their account in it; for if a third part of that quantity be ſown, there will be a much greater produce, and the corn will be much leſs liable to lodge, as I (ſays Mr. Miller) have many times experienced; for when corn, or any other vegetables ſtand very cloſe, the ſtalks are drawn up weak, and thence incapable of reſiſting the force of the winds, or ſupporting themſelves under heavy rains: but when they are at a proper diſtance, their ſtalks will be more than twice the ſize of the other, and therefore are ſeldom laid. I have frequently obſerved in fields where there has been a foot-path through their middle, that the corn, which has ſtood thin on each ſide of the path, hath ſtood upright, when all the reſt on both ſides has been laid flat on the ground; and whoever will give himſelf the trouble to examine theſe roots near the path, will find them tiller out (*i. e.* have a greater number of ſtalks) to more than four times the quantity of the other parts of the field. I have ſeen experiments made by ſowing barley in rows

acroſs divers parts of the ſame field, and the grains ſown thin in the rows, ſo that the roots were three or four inches aſunder in the rows, and the rows a foot diſtant; the intermediate ſpaces of the ſame field were at the ſame time ſown broad-caſt in the uſual way; the ſucceſs was this: the roots which ſtood thin in the rows tillered out from ten or twelve, to upwards of thirty ſtalks on each root, the ſtalks were ſtronger, the ears longer, and the grains larger than any of thoſe ſown in the common way; and when thoſe parts of the field, where the corn was ſown in the uſual way, has been lodged, theſe parts ſown thin have ſupported their upright poſition againſt wind and rain, though the rows have been made not only lengthways, but acroſs the lands, in ſeveral poſitions; ſo that there could be no alteration in regard to the goodneſs of the land, or the ſituation of the corn: where therefore ſuch experiments have been made, and always attended with equal ſucceſs, there can be no room to doubt which of the two methods is moſt eligible, ſince if the crops were only ſuppoſed to be equal in both, the ſaving two thirds of the corn ſown is a very great advantage, and deſerves a national conſideration, as ſuch a ſaving, in ſcarce times, might be of very great benefit to the public. This ſaving of ſeed-corn muſt be underſtood to regard ſuch as is ſown broad-caſt; for if it be ſown in drills, an eighth part of the ſeed uſually ſown will be ſufficient for an acre of land, and the produce will be greater; for all ſorts of corn are naturally inclined to ſend out ſeveral ſtalks from each root, which they rarely fail to do where the roots are at a proper diſtance, and have room; nor do ſtalks grow in this caſe near ſo tall, but are much ſtronger than when they are near together, when they rarely have more than two or three ſtalks; whereas thoſe roots which have proper room, ſeldom have leſs than ten or twelve. I have had eighty ſtalks upon one root of barley, which were ſtrong, produced long ears, and the grain was better filled than any I ever ſaw grow in the common method of huſbandry, and the land on which this grew was not very rich; but I have frequently obſerved on the ſides of hot-beds in the kitchen gardens, where barley ſtraw has been uſed for covering the beds, that ſome of the grains left in the ears have dropped out and grown, the roots have produced from thirty to ſixty ſtalks each, and thoſe have been four or five times larger than the ſtalks ever arrive at in the common way; but to this I know it will be objected, that although upon rich ground in a garden, theſe roots of corn may probably have ſo many ſtalks, yet in poor land they will not have ſuch produce; therefore unleſs a greater quantity of ſeeds be ſown, the crop will not be worth ſtanding, which is one of the greateſt fallacies that can be imagined; for to ſuppoſe that poor land can nouriſh more than twice the number of roots in the ſame ſpace as rich land, is ſuch an abſurdity, as one would hardly ſuppoſe any perſon of common underſtanding guilty of; and yet ſo it is: for the general practice is to allow a greater quantity of ſeed to poor land, than for richer ground, not conſidering that where the roots ſtand ſo cloſe, they will deprive each other of their nouriſhment, and conſequently ſtarve themſelves, which is always the caſe when the roots ſtand cloſe, which any perſon may at firſt ſight obſerve in any part of the fields where the corn happens to ſcatter when they are ſowing it; or in places where by harrowing, the ſeed is drawn in heaps, thoſe patches will ſtarve, and never grow to a third part of the ſize as the other parts of the ſame field; and yet, common as this is, it is little noticed by farmers, otherwiſe they ſurely would not continue their old cuſtom of ſowing. I have made many experiments for ſeveral years in the pooreſt land, and have always found that all crops, which were ſown or planted at a greater diſtance than uſual, have ſucceeded beſt upon ſuch land; and I am convinced if farmers could be prevailed upon to quit their prejudices, and make trial of this method of ſowing their corn thin, they would ſoon ſee the advantage of this huſbandry. *Miller's Gard. Dic.*

It is a common practice in ſome parts to ſcatter the dung of pigeons, poultry, &c. over barley and other corn, after the corn is ſown; but if this method be purſued, care ſhould be taken to ſcatter the dung immediately; becauſe then the ſhoot will eaſily make its way through: but when laid on later, it burns up, and eats the blades of the young plants. *Mortimer's Huſbandry, vol.* I. *p.* 133.

It too often happens from unfavourable weather, and an extremely dry ſpring, that it is impoſſible by the common method to break the clods, and prepare the ground ſufficiently for ſowing barley; in which caſe it has been the uſual method to break the clods with a large beetle called, from its uſe, a clotting-beetle. But this being a very chargeable and tedious method of preparing land, induced the ingenious Mr. Randall of York, to conſtruct an inſtrument, which he calls a ſpiky roller, by the aſſiſtance of which a large quantity of land may, in ſuch a dry ſeaſon, be ſoon reduced to an exceeding fine tilth, with very little trouble. The reader will find a full account of this uſeful inſtrument, the manner of making and uſing it, together with a figure of the roller, under the article SPIKY ROLLER.

After the barley is ſown and harrowed in, the ground ſhould be rolled after the firſt ſhower of rain, to break the clods and lay the earth ſmooth; which will render it better to mow the barley, and alſo cauſe the earth to be cloſer to the roots of the corn, which will be of great ſervice to it in dry weather.

And alſo when the barley has been up three weeks or a month, it will be a very good method to roll it over with a weighty roller, which will again preſs the earth cloſe to the roots of the corn, and thereby prevent the ſun and air from penetrating the ground, which will be of ſingular ſervice in dry ſeaſons; and this rolling of it before it ſtalks, will cauſe it to tiller out into a greater number of ſtalks, ſo that if the plants ſhould be thin, this will cauſe them to ſpread ſo as to fill the ground, and likewiſe ſtrengthen the ſtalks. *Miller's Gard. Dict.*

If the corn grows too rank, as it is ſometimes thought to do in a wet ſpring, mowing is then much better than feeding it; becauſe the ſcythe takes off only the rank tops, but the ſheep feed upon all indifferently; nor ſhould they even in any caſe be left upon it too long, becauſe being particularly fond of the ſweet end of the ſtalk next the root, they will bite ſo cloſe as to injure the future growth of the plant.

Barley is ripe when the red roan, as the farmers call it, meaning a reddiſh colour on the ear, is gone off, when the ears droop and fall, as it were, double againſt the ſtraw, and the ſtalks have loſt their verdure. If it be full of weeds it muſt lie in the ſwarth till they are dry. It is not apt to ſhed; but in wet weather it will be apt to ſprout or grow muſty; and therefore every fair day after rain it ſhould be ſhook up and turned; and when it is tolerably dry, let it be made up into cocks; but be ſure never to houſe it till thoroughly dry, leſt it mow-burn, which

will make it malt worſe than if it had ſpired in the field. The common produce of barley is two or three quarters upon an acre. *Mortimer's Huſbandry, vol.* I. *p.* 133.

Mr. Liſle ſays, that poor thin barley and oats ſhould be cut a little ſooner than if the ſame plants were ſtrong and vigorous; for that the ſtraw, when the plants are full ripe, will not ſtand againſt the ſcythe. In this caſe the barley, in particular, muſt lie in ſwarth till it is thoroughly dry. Some of his barley, which lay out in ſwarth five or ſix days in very fine weather, though both blighted and edge-grown, grew plump, and acquired very near as good a colour as the beſt. He reckons ſhort ſcythes the beſt for mowing lodged or crumpled corn, becauſe they miſs the feweſt plants; and obſerves that a bow upon the ſcythe, which carries away the ſwarth away before it, is preferable to a cradle, the fingers of which would be pulled to pieces by the intangled corn, in drawing back the ſcythe. *Liſle's Huſbandry, vol.* I. *p.* 335.

Mr. Du Hamel tells us, that a farmer at Acou, obſerving that the chief hopes of more than common ſucceſs by means of the New Huſbandry, were founded on the frequent ſtirring of the ground while the corn was in it, and on allowing each plant ſufficient ſpace to extend its roots, and thereby collect the more nouriſhment, tried an experiment which appeared to him very proper to diſcover whether the effect would anſwer. He carefully cultivated a grain of barley, which grew by chance in his vineyard. This plant, ſaid he, ſtands diſtant from any other: it can extend its roots every way; it is in a rich ſoil, and cannot want for food: by joining frequent culture to theſe advantages, this plant of barley, according to theſe principles of the New Huſbandry, ought to yield a ſurprizing increaſe. His reaſoning was juſt, and the experiment confirmed it; for this ſingle grain of barley produced two hundred ears, and about thirty ſtalks which had no ears. Some of the ſtalks were four feet high, and moſt of them three. Mr. Du Hamel counted twenty-four grains in a middling ear. Thus one grain, planted in a good ſoil, and well cultivated, produced 4800 grains; and the ſtraw of this ſingle plant of barley made of itſelf a ſheaf. *Tranſlation of Du Hamel's Huſb. p* 113.

We have already obſerved, under the article SOAP ASHES, that Sir Hugh Platt, by ſpreading that manure over his land, had a ſurprizing crop of barley, the plants of which were of a prodigious ſize. An ear of this barley is delineated in its natural ſize, Plate III. Fig. 1.

BARM, yeaſt, or the thick cruſt that riſes on the ſurface of beer, while it is fermenting.

BARN, a covered place or houſe for laying up any ſort of grain, hay, or ſtraw.

Every farm ſhould be furniſhed with barns proportioned to the quantity of corn it produces, which will be a great advantage to the farmer. The barns ſhould have a dry ſituation, and be properly placed in the farm-yard, but not quite contiguous to the houſe, for fear of fire.

A barn is uſually made of wooden frames covered with planks of oak, or built of brick or ſtone, which ever the country affords in the greater plenty; and in either caſe there ſhould be ſuch vent-holes, or openings, in its ſides or walls, as to afford free admittance to the air, in order to prevent the mouldineſs that would otherwiſe, from the leaſt dampneſs lodge in the corn. The gable ends may be always of brick or ſtone, for the ſake of greater ſolidity, and the whole may be roofed with thatch or tiles, as is moſt convenient. The ſize of the barn ſhould be proportioned to the crop uſually produced by the land to which it belongs. Two large folding doors ſhould face each other, one in each ſide of the building, for the convenience of carrying in or out a waggon-load of corn in ſheaves; and theſe doors ſhould be of the ſame breadth with the threſhing floor to afford the more light and air; the former for the threſhers, and the latter for winnowing. Over the threſhing floor, and a little above the reach of the flail, poles are often laid a croſs from one beam to another, to form a kind of upper-floor, upon which the threſher may throw the ſtraw or haulm, to make an immediate clearing, till he has time to ſtow it more properly elſewhere: and on the outſide, over the great doors, it will be right to form a large penthouſe, made to project ſufficiently to cover a load of corn, in caſe a ſudden ſtorm ſhould come on before it can be houſed; and alſo to ſhelter the poultry in the farm-yard, in great heat, or bad weather.

It is moſt adviſable, and indeed moſt commonly practiſed in countries that abound in corn, to have a ſeparate barn for wheat, another for ſpring-corn, ſuch as barley and oats, and a third for peas, tares, lentils, clover, ſainfoin, &c.

Some art, which muſt be the reſult of practice, is neceſſary in placing and piling up the ſheaves in barns. But it may not be uſeleſs to obſerve, that it is always neceſſary to preſs them as cloſe to the walls of the barn as poſſible, ſo as not to afford the leaſt room for rats, or other vermin to creep in between them: for if they once get admittance they will ſoon penetrate further, lodge themſelves in the mow, and do prodigious damage to the corn. Where this misfortune happens, the only remedy is to take down the mow, kill the vermin, and pile it up a-new.

But the floor, or threſhing place, is the principal part of every barn, and therefore the greateſt care ought to be taken in making it. In order to this, the ſurface of the intended threſhing place is dug away to the depth of about ſix inches, and the earth thus taken out, after being well cleared of ſtones, is mixed with the ſtrongeſt clay that can be procured, and with the dung of cows or oxen. This mixture is then worked together with water, till it is of the conſiſtence of ſtiff mortar, and the compoſt thus made is ſpread as ſmooth as poſſible with a trowel, upon the ſpot from whence the earth was taken. As it cracks in drying, it muſt be beaten down with great force; or rolled with a heavy roller till all the crevices are filled up: and this muſt be continued till it is quite ſolid, hard, and firm.

The beſt barn-floor, both for threſhing and for keeping corn, is that which is drieſt, ſmootheſt, moſt completely ſolid, and conſequently freeſt from cracks and holes, in which inſects and vermin may ſhelter themſelves, and even breed. The ancients were remarkably careful in this reſpect, as we learn from Cato, Varro, and Columella, the laſt of which excellent huſbandman relates particularly the great pains they took, firſt to dig up the ground to ſome depth, in order to moiſten it with freſh lees of oil, but not with any that had ſalt in them; then to mix it thoroughly with chaff, and ram it down as cloſe as poſſible; afterwards as it dried, to ſtop all the cracks and crevices that appeared, to continue beating it down with great force, to render it quite level; and, laſtly, to ſtrew it again with chaff, which they trod in, and then left it to be completely dried by the ſun. All theſe writers agree, that the lees of oil, thus uſed, prevent the growth of weeds in theſe floors,

and

and contribnte to preſerve the corn from being plundered by the mice and ants. Their barns were always ſeated high, and as dry as poſſible.

A floor made in the above manner muſt be greatly preferable to either ſtone, or the earthen floors, too common in many parts of England, and from which ſuch dampneſs has been communicated to the corn, as has rendered wheat, for example, ſixpence a buſhel worſe, either for keeping or exporting.

Boarded threſhing-floors, made of ſound, thick, well ſeaſoned planks of oak, are excellent for ſervice, will laſt a long time, and may be converted into good floorings for rooms, by plaining them down, after they are become too uneven for the purpoſe originally intended.

BARNACLES, horſe-twitchers, or brakes, are a ſort of inſtruments uſed by farriers to put upon horſes noſes, when they will not ſtand quietly, to be ſhod, blooded, or dreſſed.

There are ſeveral ſorts of barnacles, the common ſort are rollers of wood bound together, with the horſe's noſe between them. Another ſort have handles, and are therefore termed pincers, to diſtinguiſh them from the foregoing. And a third ſort are held together at the top by a ring incloſing buttons, having the top buttons held by an iron pin rivetting through them.

BARREN CORN, a name given to a diſtemper in corn, by M. Aimen, who firſt obſerved it. The ears of wheat or rye, the ſpecies moſt ſubject to this diſtemper, which are thus affected, are long, lean and white; in ſome the ſtamina or ſmall threads in the middle of the flower, are dry, tranſparent and horned; the female organs are ſmall, whiter, and leſs velvetty, than in healthy ears: in others, the filaments are ſwelled, the apices, or knobs on the tops of the ſtamina, void of duſt or farina, and the ſtigmata badly unfolded. The ſtigmata of all the bloſſoms of an ear are ſometimes dried and parched; at other times the apices are ſwelled.

M. Aimen thinks with Theophraſtus, that theſe accidents happen to ſuch plants as grow with moſt vigour. Then ſays he, the ſap, which is powerfully conveyed into the leaves and other parts of the plants, prevents the organs of fructification from unfolding themſelves.

He alſo imagines that froſt may cauſe this accident, by particularly affecting the female organs: and he thinks, that a hot gleam of ſun-ſhine coming after a hard ſhower may have the ſame effect. If this be the caſe, the diſtemper in queſtion may be ranked with the parched and ſhrivelled corn, or perhaps with the empty-eared corn. Laſtly, the ſame naturaliſt obſerves, that inſects are ſometimes, though very rarely, the cauſe of this diſtemper.

BARREN EARTH, a name given by ſome to the under ſtratum of earth, or that which lies below the ſtratum frequently turned up, and cultivated for the nouriſhment of plants.

This notion of the under ſtratum of earth being dead or barren, and will deſtroy every vegetable planted in it, ſeems to be founded on a miſtake: for every kind of earth, whether it be upon or under the ſurface, is certainly capable of giving nouriſhment to plants, provided it be for ſome im expoſed to the influence of the air, froſts, &c. in order to enable it to diſpenſe its nutritive qualities. An earth ſeemingly barren dug out of a deep pit, will, if ſpread on the ſurface, and properly ſtirred and expoſed, be ſoon in a condition of bearing plants, and even much more ſo than the earth, which having been long at the ſurface is almoſt exhauſted, by the number of vegetables it has ſucceſſively nouriſhed. The notion of any earth being barren, merely becauſe it is placed at a diſtance from the ſurface, is by the moſt intelligent naturaliſts exploded: its particles may perhaps want a proper arangement, but it always poſſeſſes the vegetative quality. This opinion has been confirmed by repeated experiments; and a very remarkable one of this kind is related by a correſpondent of the editors of the *Muſeum Ruſticum*, *vol.* I. *p.* 10, &c. where the writer tells us, that he planted a quantity of potatoes in a piece of what they called dead barren earth, the upper bed having been taken away and ſpread on the adjacent land. Yet in this ſpot of ground dug two ſpits deep by the help of ſpades and mattocks, and the earth broke as fine as poſſible, he had a prodigious crop of remarkably fine potatoes; though the earth had not been expoſed to the influence of the atmoſphere above two months, it being dug in February, and the potatoes planted the latter end of March.

BARREN SPRINGS, a name given by huſbandmen to ſuch ſprings whoſe waters are injurious to land.

Moſt waters that flow from coal mines, or through beds of ſulphureous minerals, have this pernicious quality, deſtroying vegetables, inſtead of nouriſhing them. They have a harſh and brackiſh taſte, are generally of a reddiſh colour, and depoſit a reddiſh ſediment in the chanel through which they flow. They are much better when they have run ſome diſtance, than at their fireſt breaking out on the ſurface of the earth. *Mortimer's Huſbandry*, *vol.* I. *p.* 20.

BARS, the fleſhy rows that run a-croſs a horſe's mouth, reaching almoſt to the palate. They are very diſtinguiſhable in young horſes.

BARTH, a warm place, or paſture, for calves or lambs.

BARTON, *or* BARKEN, the yard of a houſe.

BASTARD *Alkanet*, called alſo *baſtard gromill*, or *ſalfarn*, a weed common among corn, eſpecially rye. It may be eaſily known by its red roots, which yield a red tincture, and are uſed by the young girls in Sweden to colour their cheeks. From the root uſually riſes a ſingle ſtem about a foot high, rough and branching out at the top. The flowers are ſmall and white, ſurrounded with five long, narrow, hairy leaves, forming what the botaniſts call the empalement of the flower cup, and ſucceeded by four white rough ſeeds. *See a figure of this plant on* Plate III. Fig. 2.

BAVINS, bruſh-faggots, or faggots made with the bruſh-wood at length.

BAUSON, the ſame with badger. *See* BADGER.

BAY, a colour in horſes, ſo called from its reſembling the colour of a dried bay-leaf.

There are various degrees of this colour from the lighteſt bay to the dark, which approaches nearly to the brown, but is always more gay and ſhining. The bright bay is an exceeding beautiful colour, becauſe a bright bay horſe has generally a reddiſh daſh, with a gilded aſpect, his main and tail black, with a black or dark liſt down his back. The middle colours of bay have alſo frequently the black liſt, with black main and tail. And the dark bays have almoſt always their knees and paſterns black; and we meet with ſeveral ſorts of bays, that have their whole limbs black from their knees and hocks downwards. The bays that have no liſt on their backs, are, for the moſt part, black over their reins, which goes off by an imper-

ceptible gradation from dark to light towards the belly and flanks. Some of these incline to a brown, and are more or less dappled. The bay is one of the best colours, and horses of all the different kinds of bays are commonly good, unless when accidents happen to spoil them while they are colts. *Gibson on horses, vol.* I. *pag.* 44.

BAY *of a barn*, that part where the mow is placed. Hence such barns as have the threshing floor in the middle, and a space for a mow on each side, are called barns of two bays, &c.

BAYARD, a bay horse.

BAY-SALT, is a salt made from sea-water by the heat of the sun only, without the assistance of fire. The crystals of this salt are much larger than those of the common salt, occasioned by the gentle evaporation of the watery particles; whence the crystals have a sufficient time to shoot, which they have not in the common method. From this circumstance bay-salt becomes much better for salting meat, &c. than the common.

BEANS, a sort of pulse well known, and of which there are two species, distinguished by the name of the garden-bean, and the horse-bean.

Some few trials have been lately made in France to raise garden beans in open fields, on the principles of the new husbandry: and the result of these experiments sufficiently indicate that very large crops may be procured by that method if properly practised. M. Du Hamel tells us, that M. Eyma planted, in December 1755, in a field near Bourdeaux, the common sort of garden beans, in a middling soil not dunged, but thoroughly ploughed a foot deep. The rows were two feet asunder, and the plants a foot distant from one another. These beans, which every one thought too thinly sown, being assisted by frequent hoeings, yielded a greater crop than any in the common way. When they begin to ripen, M. Eyma gave the spaces betwen them a good ploughing, and on the twenty-third of June sowed in each of them a row of red kidney-beans, which came up very well. In a fortnight after he plucked up the garden beans, and gave the ground on which they stood a slight hoeing. These kidney-beans proved the finest he ever saw. He repeated the same experiment in 1756, and was rewarded with such success as surpassed his warmest expectations. *Traité de la Culture des Terres, tom.* V. *page* 81.

Horse BEANS, delight in a strong moist soil, and an open exposure, for they never thrive well on dry warm land, or in small inclosures, where they must, and are frequently attacked by the black dolphin fly: these insects are often in such quantities as to cover the stems of the beans entirely, especially all the upper part of them; and whenever this happens, the beans seldom come to good; but in open fields where the soil is strong, and the plants have room, this rarely happens.

These beans are usually sown on land which is fresh broken up, because they are of use to break and pulverise the ground, as also to destroy weeds; so that the land is rendered much better for corn, after a crop of beans, than it would have been before, especially if they are sown and managed according to the new husbandry, with a drill plough, and the horse-hoe used to stir the ground between the rows of beans, which will prevent the growth of weeds, and pulverize the ground, whereby a much greater crop of beans may, with more certainty, be expected, and the land will be better prepared for whatever crop it is designed for after.

The season for sowing beans is from the middle of February to the end of March, according to the nature of the soil; the strongest wet soil should always be last sown. The usual quantity of beans sown on an acre of land, is about three bushels, tho' this is double the quantity that need be sown, especially according to the new husbandry; but it will be necessary first to set down the practice according to the old husbandry, and then give directions for their management according to the new. The method of sowing is after the plough, in the bottom of the furrows; but then the furrows should not be more than five, or at most six inches deep. If the land be newly broken up, it is usual to plough it early in the autumn, and let it lie in ridges till after Christmas, then to plough it in small furrows, and lay the ground very smooth. These two ploughings will break the ground fine enough for beans, and the third ploughing is to sow the beans, when the furrows should be made shallow, as before mentioned.

Most people set their beans too close; for as some lay the beans in the furrows after the plough, and others lay them before the plough, and plough them in; so by both methods the beans are as close as the furrows are made, which is much too near: for when they are on strong good land, they are generally drawn up to a very great height, and are not so apt to pod as when they have more room, and are of a lower growth. The better way, therefore, is to make the furrows three feet asunder or more, which will cause them to branch out into many stalks, and bear in greater plenty than when they are closer; by this method less than half the quantity of beans will be sufficient for an acre of land, and the air being admitted between the rows, the beans will ripen much earlier, and more equally than in the common way. *Miller's Gard. Dict.*

It has been already observed, that the black dolphin fly often destroys a crop of beans, and to prevent which, a correspondent of the editors of the *Museum Rusticum* proposes, that when these destructive insects are first seen on the tops of the beans, one or more persons, provided each with a scymeter or hanger, should be sent in the field, and strike off the heads of the beans. He adds, that by this means a crop has been often saved, this fly being seldom known to rise again when it once falls with the bean-top to the ground. *Museum Rusticum, vol.* III. *pag.* 233.

Another correspondent in the above work says, that as soon as the beans have got six leaves, the sheep should be turned in to feed among them; for they will eat up all the young weeds, even the melilot, without touching the beans. He adds, that the sheep may be kept every day among the beans till they are in blossom; but they must not be suffered to lie down. *Museum Rusticum, vol.* III. *pag.* 339.

When beans are intended to be planted according to the new husbandry, the ground should be four times ploughed before the beans are set, which will break the clods, and render it much better for planting. Then use a drill plough, to which a hopper is fixed for setting the beans, the drills should be made at three feet asunder, and the spring of the hopper set so as to scatter the beans

at

at three inches diſtance in the drills. By this method leſs than one buſhel of ſeed will plant an acre of land. When the beans are up, if the ground be ſtirred between the rows with a horſe-plough, it will deſtroy all the young weeds; and when the beans are advanced about three or four inches high, the ground ſhould be again ploughed between the rows, and the earth laid up to the beans; and if a third ploughing, about five or ſix weeks after be given, the ground will be kept clean from weeds, and the beans will ſtalk out, and produce a much greater crop than in the common way. *Miller's Gard. Dict.*

A correſpondent of the editors of the *Muſeum Ruſticum*, has given the following method of cultivating beans in the vale of Ayleſbury.

"Firſt, ſays he, I plough two furrows on each outſide of the land, but ſow no beans in them: I afterwards drill, with an inſtrument hereafter deſcribed, the three next furrows: then I plough two furrows without drilling any beans in them, and ſo on, ſowing three, and leaving two for intervals, till the land is finiſhed.

"When the beans are about two or three inches high, I plough two furrows up each interval, turning the furrows from the beans, ſo as to make a ridge in the middle of each interval. I have a little plough on purpoſe for this uſe, about half the ſize of a common plough, which is drawn by one horſe.

"This work ſhould be done after a rain. This year, 1764, on the fifteenth of May we had rain. I therefore went to plough in the intervals on the eighteenth, and continued at plough till all were finiſhed. On the eighth of June we had rain again. On the ninth of June I went to harrow the intervals with the triangular harrow hereafter deſcribed. About a week after that we had more rain. I then went to harrow again, going up the interval I went down before, and down that which I went up. This is what we call croſs-tining. Thus my land is laid quite ſmooth, kept clear from weeds, and the beans have a fine looſe mould to ſtrike their fibres into; and it is by far the cheapeſt way of weeding beans.

Proportions of the above DRILL (ſee Plate III. Fig. 3.)

"Diameter of the iron wheel twenty inches.

"Length of the box from A to B, twenty inches.

"Breadth of the box from B to C, ten inches.

"Depth of the box from C to D, five inches and a half.

"Diameter of the cylinder of wood upon the iron axis of the wheel, four inches. This cylinder turns out the beans regularly.

"Length of the cylinder two inches and a half. On this cylinder are twenty-one holes, a quarter of an inch deep, and half an inch in diameter.

"E is a tongue, which drops upon the cylinder, and plays up eaſily: the tongue is half an inch thick, and three quarters wide. When a larger bean than ordinary comes, it will throw the tongue up, which naturally recovers its place again; and ſo the work goes on well and even. The tongue is repreſented ſeparately with its notch at E: the notch does not go quite through it; it falls exactly on the holes of the cylinder.

"A lid takes off to put the beans into the box, and buttons down at F."

The triangular HARROW *deſcribed* (ſee Plate III. Fig. 4.)

"From A to B eighteen inches.

"The tines are nine inches a-part.

"The three tines in the croſs-bar are only three inches and a half a part.

"E, a cock which plays upon a pin, in which are thres holes to hang the whipple tree in. If you put it into the upper hole the tines bear very heavy upon the ground: I generally uſe the middle hole." *Muſeum Ruſticum vol.* III. *p.* 26.

When the beans are ripe they are reaped with a hook, as is generally practiſed for peaſe; and after having lain a few days on the ground, they are turned, and this muſt be repeated for ſeveral times, until they are dry enough to ſtack; but the beſt method is to tie them in ſmall bundles, and ſet them upright; for then they will not be in ſo much danger to ſuffer by wet, as when they lie on the ground; and they will be more handy to carry and ſtack, than if they were looſe.

The common produce is from twenty to twenty-five buſhels on an acre of land. *Miller's Gard. Dict.*

In the ſtiff, ſtrong land, of the vale of Ayleſbury, they annually ſow a great many acres of horſe-beans, all which they uſually mow with a bare ſcythe, in ſwarth, as they call it; that is, they mow beans towards the beans; and each mower has a boy, who follows him with a fork, and lays the beans in wads. Their reaſon for mowing them in ſwarth, is on account of the largeneſs of their crops, and the beans leaning inwards; it is only when they have a thin crop, that they venture to mow them againſt their bending (this they call throating;) for ſhould they do it in common, it would break the hearts of the mowers, being as hard work again as the other.

When they mow in ſwarth, the workmen always keep the points of their ſcythes downwards, or they would ſtrip off great quantities of the beans.

In Hertfordſhire alſo, ſome farmers mow their beans with a ſcythe, and a three ribbed ſtrong cradle: this cuts a great deal in a day, lays the beans in regular rows, and ſaves the expence of a wadder; but in Buckinghamſhire they cannot uſe a cradle, their crops being in general ſo heavy, that the workmen could not carry over the ſwarth. *Muſeum Ruſticum, vol.* I. *p.* 275.

The beans ſhould lie in the mow to ſweat, before they are threſhed out; for as the haulm is very large, and ſucculent, ſo it is very apt to give and grow moiſt; but there is no danger of the beans receiving damage, if they are ſtacked tolerably dry; becauſe the pods will preſerve the beans from injury; and they will be much eaſier to threſh after they have ſweat in the mow than before; and after they have once ſweated and are dry again, they never after give.

By the new huſbandry the produce has exceeded that of the old by more than ten buſhels an acre; for if the beans cultivated in the common method are obſerved when they are in pod, it will be found that more than half way of their ſtems have no beans on them; for by ſtanding cloſe, they are drawn up very tall, ſo the tops of the ſtalks only produce, and all the lower part is naked; whereas in the new method, they bear almoſt to the ground; and as the joints of the ſtems are ſhorter, ſo the beans grow cloſer together. *Miller's Gard. Dict.*

Beans are a part of the diet of horſes, but chiefly uſed in mixture with bran or chaff, and by ſome upon the road, with oats; but they are moſtly given to coach-horſes and others that are conſtantly in draught. They afford the ſtrongeſt nouriſhment of all other grain, and will enable horſes to go through a great deal of heavy labour; but in ſome ſeaſons they breed a kind of vermin, which the farmers call a red bug, and is reckoned dangerous, and therefore the beſt way at ſuch times is to have them well dried and ſplit, which may, in ſome meaſure, deſtroy the malignity that is engendered in them. *Gibſon on horſes, vol.* I. *p.* 171.

Whoever has frequented the corn markets in London cannot but know that old horſe-beans ſell from ten to fifteen, and even more, per cent. dearer than new corn: becauſe new beans will, by their abundant crudity, give a horſe the gripes, and other diſorders equally fatal. To prevent ſuch conſequences, and at the ſame time ſave the difference between the expence of old and new corn, a correſpondent of the editors of the *Muſeum Ruſticum* tells us that he made the following experiment.

He purchaſed a quantity of new beans, and filled a large tub with them, pumping in as much water as was neceſſary to wet them: after ſoaking about ten hours he drew off the water, and laid the beans in a heap on the floor. In this manner he ſuffered them to continue till they began to heat, when he ſpread them out thinner, moving them often with a malt ſhovel, and letting them lie in beds till the germ ſwelled and became turgid. Then he carried them to a malt-kiln, and dried them gradually; and gave part of them to his horſes, as ſoon as cold.

By this preparation he aſſures us new beans will agree as well with cattle as any old corn that can be procured at the market.

The greateſt nicety in the operation is to prevent the beans from ſprouting, or malting, which would injure them, and not to dry them by too quick a heat. *Muſeum Ruſticum, vol.* I. *p.* 327.

BEAR, or *bere*, a ſpecies of barley, called alſo winter barley, ſquare barley, and big.

This grain is chiefly cultivated in Scotland, the northern parts of England, and Ireland. It yields a very large return, but is not eſteemed ſo good for malting as the common barley, for which reaſon it is very little cultivated in the ſouthern parts of England. *See* BARLEY.

BEARD, the ſame with awm. *See* AWMS.

BEARD *of a horſe*, a name given to the hairs ſcattered on his under lip to the place where the curb of the bridle reſts.

BEARDED *oat graſs*, the ſame with wild oats. *See the article* *Wild* OATS.

BEAR's EAR, the Engliſh name for the plant generally called auricula.

BEC, a ſmall brook, a rivulet, a little ſtream of water.

BEDS, a name given by many writers on the new huſbandry to the ſpaces occupied by the rows of corn; to diſtinguiſh them from the intervals, or open ſpaces between theſe beds, which they term alleys. *See* ALLEY.

Yellow ladies BEDSTRAW, *cheeſe-rennet*, *maid's-hair*, or *petty mugwort*, a weed very common in moiſt meadows and paſture grounds. Its ſlender ſtalks riſe to about a foot in height. The leaves come out in whorls, eight or nine together. They are long, narrow, and of a green colour. Two little branches generally come out near the top of the ſtalk, ſupporting a conſiderable number of ſmall yellow flowers, conſiſting of one petal, divided into four parts, and ſucceeded by two large kidney ſhaped ſeeds.

BEE, a ſmall and well known inſect, famous for its induſtry.

This uſeful and laborious inſect is divided by two ligaments into three parts or portions, the head, the breaſt, and the belly. The head is armed with two jaws and a trunk; the former of which play like two jaws opening and ſhutting to the right and left. The trunk is long and taper, and, at the ſame time, extremely pliant and flexible, being deſtined by nature for the inſect to probe to the bottom of the flowers through all the impediments of their chives and foliage; and drain them of their treaſured ſweets: but were this trunk to be always extended, it would prove incommodious, and be liable to be injured by a thouſand accidents, it is therefore of ſuch a ſtructure, that, after the performance of its neceſſary functions, it may be contracted, or rather folded up; and beſides this, it is fortified againſt all injuries by four ſtrong ſcales, two of which cloſely ſheathe it, and the two others, whoſe cavities and dimenſions are larger, encompaſs the whole. From the middle part or breaſt of the bee grow the legs, which are ſix in number: and at the extremity of the paws are two little hooks, diſcernible by the microſcope, which appear like ſickles, with their points oppoſite to each other. The wings are four, two greater and two ſmaller, which not only ſerve to tranſport them through the air, but, by the noiſe they make, to give notice of their departure and arrival, and to animate them mutually to their ſeveral labours. The hairs with which the whole body is covered, are of ſingular uſe in retaining the ſmall duſt that falls from the chives of the flowers, of which the wax is formed, as will be obſerved hereafter. The belly of the bee conſiſts of ſix rings, which ſlide over one another, and may therefore be lengthened or contracted at pleaſure; and the inſide of this part of the body contains the inteſtines, the bag of honey, the bag of poiſon, and the ſting. The office of the inteſtines is the ſame as in other animals. The bag of honey is tranſparent and cryſtal, containing the ſweet juices extracted from flowers, which the bee diſcharges into the cells of the magazine for the ſupport of the community in winter. The bag of poiſon hangs at the root of the ſting, through the cavity of which, as through a pipe, the bee ejects ſome drops of this venomous liquor into the wound, and ſo renders the pain more exceſſive. The mechaniſm of the ſting is admirable, being compoſed of two darts, incloſed within a ſheath that tapers into a fine point, near which is an opening to let out the poiſon. The two darts are ejected through another aperture, which, being armed with ſeveral ſharp beards like thoſe of fiſh-hooks, are not eaſily drawn back again by the bee; and indeed ſhe never diſengages them if the wounded party happens to ſtart and put her into confuſion; but if one can have patience to continue calm and unmoved, ſhe clinches thoſe lateral points round the ſhaft of the dart, by which means ſhe recovers her weapons, and gives leſs pain to the perſon ſtung. The liquor which at the ſame time ſhe infuſes into the wound, cauſes a fermentation, attended with a ſwelling, which continues

ſeveral days; but that may be prevented by immediately pulling out the ſting, and enlarging the puncture, to let the venomous matter have room to eſcape.

Let us now conſider the generation, polity, and labours of theſe inſects, the true knowledge of which is very much owing to the modern invention of glaſs-hives, through which all the ſecrets of the community are laid open to a curious obſerver. Any perſon who carefully examines a hive at different ſeaſons of the year, will diſtinguiſh three ſorts of bees; of which the far greater number are the common working bees, who do all the buſineſs of the hive, and ſeem to be neither male nor female. The working bee is repreſented at C (Plate III. Fig. 5.) The ſecond ſort, called drones, are the males, and ſomewhat larger than the former (as A, Fig. 6.) they have no ſting, nor even ſtir from the hive, but live upon the honey prepared by the others. The third ſort is a much larger and longer bodied bee, of which there are often but one in every ſwarm or colony of young bees, who are from time to time detached from the hive in ſearch of another habitation. This large bee is what the ancients called the king, from the reſpect they always ſaw paid to it by other bees; but being the female, the moderns more properly give it the title of queen, or mother of the ſwarm. *See* Plate II. Fig. 7. B.

When theſe induſtrious inſects begin their works, it is obſerved they divide themſelves into four parties, one of which is deſtined to the fields to provide materials for the ſtructure; the ſecond works upon thoſe materials, and forms them into a rough ſketch of the dimenſions and partitions of the cells; the third examines and adjuſts the angles, removes the ſuperfluous wax, poliſhes the work, and gives it its neceſſary perfection; and the fourth is employed in bringing proviſions to the labourers that build them, becauſe poliſhing is not ſo laborious. They begin their work at the top of the hive, continuing downwards to the bottom, and from one ſide to another; and to make it the more ſolid they uſe a ſort of tempered wax, reſembling glue. The form of the cells of the honey-comb is hexagonal, which figure, beſides what is common with a ſquare and equilateral triangle, has the advantage of including a greater ſpace within the ſame ſurface.

The expedition of the bees in their labour, is almoſt incredible; for notwithſtanding the elegance and juſt proportions of the work, they are ſo indefatigable, that they will, in one day, finiſh a honey-comb a foot long, and ſix inches broad, capable of receiving three thouſand bees.

It is not eaſy to know, particularly, the manner in which they employ themſelves at this work, on account of the number of bees then in motion, by which means the eye can hardly diſtinguiſh any thing but confuſion. We have however been able to obſerve the following particulars: ſome bees, bearing in each of their talons a little piece of wax, are ſeen running to the places where their companions are at work upon the combs; at their arrival they faſten the wax to the work by means of the ſame talons, which they apply ſometimes to the right, and ſometimes to the left. Each bee is employed but a ſhort time on this work, when another takes its place.

While a part of the bees are at work in conſtructing the cells, others are employed in perfecting thoſe that are newly modelled, finiſhing the angles, ſides, and baſes, in ſo exquiſite a manner, and with ſuch remarkable delicacy, that three or four of theſe ſides laid upon one another, are not thicker than a leaf of common paper; and becauſe the entrance of the cell, which is adapted to the ſize of the bee, would on account of this delicacy, be ſubject to break, they ſtrengthen the entrance of each cell with a border of wax.

We have already obſerved, that the bees which build the cells work but a little while at a time; but it is different with regard to thoſe that poliſh them, for they work for a long while, and with great expedition, never intermitting their labour, unleſs it be to carry out of the cell the particles of wax taken off in poliſhing: and, to prevent this wax from being loſt, other bees ſtand ready to receive it from the poliſhers, and carry it to ſome other part, in order to its being employed.

Each comb has two rows of cells oppoſite to each other, which have their common baſes. The thickneſs of each comb is ſomething leſs than an inch; and, conſequently, the depth of each cell about five lines: but at the ſame time the breadth of each is little more than two.

All the combs are conſtructed with cells of this ſize, except a ſmall number of others in ſome particular parts of the hive, which are larger and appropriated to the lodging eggs, that afterwards become drones, or male bees.

There are alſo, in ſome parts of the hive, three or four cells bigger than the others, and conſtructed in a different manner. They are of a ſpheroidical figure, open in the inferior part, and attached to the extremities of the combs.

When the cells are completed, the queen takes poſſeſſion of thoſe ſhe likes beſt to depoſite her eggs in, and the reſt are left to be filled with honey. She lays one egg in each cell, and ſometimes more than an hundred of thoſe eggs in a day; but what is ſtill more remarkable, ſhe lays thoſe eggs which are to produce common bees in cells of the common ſhape and ſize, thoſe that are to become drones or males, in the cells of a larger ſize, and depoſites thoſe which are to become females, like herſelf, in the ſpheroidical cells already deſcribed.

Theſe eggs, after lying ſome time in the cells, are hatched into maggots, and fed with honey ten or twelve days, after which the other bees cloſe up the cells with a thin piece of wax; and under this covering they become gradually transformed into bees, in the manner as ſilk-worms are into butterflies. Having undergone this change, the young bees pierce through their waxen doors, wipe off the humidity from their little wings, take their flight into the fields, rob the flowers of their ſweets, and are perfectly acquainted with every neceſſary circumſtance of their future conduct. As to the males or drones, which are deſtined only to propagate their ſpecies, they live very comfortably for about three months after they are hatched; but when that time is over, and the females are impregnated, the common bees either kill them, or drive them from the hive, as burthenſome to the community, and not a drone is to be found till the next ſeaſon.

The method in which the beees collect their wax and honey deſerves to be a little explained. At the bottom of all flowers there are certain glands which contain more or leſs honey, that is, the moſt exalted particles

of the ſugary juices of the plant. Theſe juices the bee ſucks up with her propoſcis or trunk above-mentioned, and draws it into her mouth; and when it has thus taken a ſufficient quantity into her ſtomach, returns to the hive, and diſcharges the honey into the common magazine.

When the cells prepared to receive it are full, the bees cloſe up ſome with wax till they have occaſion for the honey; the reſt they leave open, to which all the members of the ſociety reſort, and take their repaſt with a very inſtructive moderation.

It is an excellent obſervation of a modern author, that the hive is a ſchool to which numbers of people ought to be ſent; prudence, induſtry, benevolence, public ſpiritedneſs, œconomy, neatneſs, and temperance, are all viſible among the bees. Theſe little animals are actuated by a ſocial ſpirit, which forms them into a body politic, intimately united, and perfectly happy. They all labour for the general advantage; they are all ſubmiſſive to the laws and regulations of the community: having no particular intereſt, no diſtinction but thoſe which nature or the neceſſities of their young have introduced amongſt them. We never ſee them diſſatisfied with their condition, or inclinable to abandon the hive in diſguſt, or find themſelves ſlaves or neceſſitous: on the contrary, they think themſelves in perfect freedom, and perfect affluence; and ſuch indeed is their real condition. They are free, becauſe they only depend on the laws; they are happy, becauſe the concurrence of their ſeveral labours inevitably produces abundance, which contributes to the riches of each individual. Let us compare human ſocieties with this, and they will appear altogether monſtrous. Neceſſity, reaſon, and philoſophy, have eſtabliſhed them for the commendable purpoſes of mutual aid and benefits: but a ſpirit of ſelfiſhneſs deſtroys all; and one half of mankind, to load themſelves with ſuperfluities, leave the other deſtitute of common neceſſaries.

Wax is compoſed of the farina, or duſt, formed on the apices of flowers. This the bees collect, and with their fore-feet and jaws, roll up into little balls, which they convey, one at a time, to the feet of their middle legs, and from thence to the middle joints of their hind-legs, where there is a ſmall cavity like a ſpoon to receive it. Theſe balls are not, however true wax, but the ſubſtance or baſis of it: to reduce this crude ſubſtance into wax, it muſt firſt be digeſted in the body of the bee.

After the bees have brought home this crude ſubſtance, they eat it by degrees; or, at other times, three or four bees come and eaſe the loaded bee by eating each of them a ſhare, the loaded bee giving them a hint ſo to do. Hunger is not the motive of their thus eating the balls of waxy matter, eſpecially when a ſwarm is firſt hived; but it is their deſire to provide a ſpeedy ſupply of real wax for making their combs. At other times, when there is no immediate want of wax, the bees lay this matter up in repoſitories, to keep it in ſtore.

When this waxy matter is ſwallowed, it is, by the digeſtive powers of the bee, converted into real wax, which the bees again diſgorge as they work it up into combs; for it is only while thus ſoft and pliant from the ſtomach that they can fabricate it properly. That the wax thus employed is taken from their ſtomachs, appears from their making a conſiderable quantity of comb ſoon after they are hived, and even on any tree or ſhrub where they have reſted but a ſhort while before their being hived, though no balls were viſible on their legs, excepting thoſe of a few which may be juſt returned from the field.

Bees collect crude wax alſo for food; for if this was not the caſe, there would be no want of wax after the combs are made: but they are obſerved, even in old hives, to return in great numbers loaded with ſuch matter, which is depoſited in particular cells, and is known by the name of *bee-bread*. We may gueſs that they conſume a great deal of this ſubſtance in food, by the quantity collected, which, by computation, may in ſome hives amount to an hundred weight in a ſeaſon, whilſt the real wax in ſuch an hive does not perhaps exceed two pounds.

But beſides the three ſubſtances, honey, wax, and bee-bread, already mentioned, there is another with which the bees cloſe every crevice in their hives, and which is called propolis. It is a kind of reſin eaſy to be rolled out, much more tenacious than wax, and more eaſily fixed. It does not ſeem to require any preparation, being a real reſin, which they collect from trees, and employ as they find it. It grows very hard in the hive, but may be ſoftened by heat. It is diſſoluble in ſpirit of wine. It commonly diffuſes a very agreeable ſmell when heated. Its outward colour is of a reddiſh brown; its inſide reſembles wax, and is a little yellowiſh. When the bees make uſe of it, it is ſoft and pliable; but it hardens daily, and becomes in time harder than wax. This propolis ſerves alſo for another purpoſe, which is, that when a ſnail, ſlug, or any other creature too large to be carried out by the bees, has been ſlain in the hive, they caſe it over with this ſubſtance, and thereby prevent the bad effects of the putrid ſmell ariſing from dead bodies.

When the hive is become too much crowded, by the addition of the young brood, a part of the bees think of finding themſelves a more commodious habitation, and with that view ſingle out the moſt forward of the young queens. A new ſwarm is therefore conſtantly compoſed of one queen at leaſt, and of ſeveral thouſand working bees, as well as of ſome hundreds of drones. The working bees are ſome old, ſome young.

Scarce has the colony arrived at its new habitation, when the working bees labour with the utmoſt diligence, to procure materials for food and building. Their principal aim is not only to have cells in which they may depoſit their honey; a ſtronger motive ſeems to animate them. They ſeem to know that their queen is in haſte to lay her eggs. Their induſtry is ſuch, that in twenty-four hours they will have made combs twenty inches long, and wide in proportion. They make more wax during their firſt fortnight, if the ſeaſon is favourable than they do during all the reſt of the year. Other bees are at the ſame time buſy in ſtopping all the holes and crevices they find in their new hive, in order to guard againſt the entrance of inſects which covet their honey, their wax, or themſelves; and alſo to exclude the cold air, for it is indiſpenſably neceſſary that they be lodged warm.

When the bees firſt ſettle in ſwarming, indeed when they at any time reſt themſelves, there is ſomething very particular in their method of taking their repoſe. It is done, by collecting themſelves in a heap, and hanging

ing to each other by their feet. They ſometimes extend theſe heaps to a conſiderable length. It would ſeem probable to us, that the bees from which the others hang, muſt have a conſiderable weight ſuſpended to them. All that can be ſaid is, that the bees muſt find this to be the ſituation agreeable to themſelves. They may perhaps have a method of diſtending themſelves with air, thereby to leſſen their ſpecific gravity, in the ſame manner as fiſhes do, in order to alter their gravity, compared with water.

When a ſwarm divides into two or more bands, which ſettle ſeparately, this diviſion is a ſure ſign that there are two or more queens among them. One of theſe cluſters is generally larger than the other. The bees of the ſmaller cluſter, or cluſters, detach themſelves by little and little, till at laſt the whole, together with the queen, or queens, unite with the larger cluſter. As ſoon as the bees are hived and ſettled, the ſupernumerary queen, or queens, muſt be ſacrificed to the peace and tranquillity of the hive. This execution generally raiſes a conſiderable commotion in the hive, and ſeveral other bees, as well as the queen or queens, loſe their lives. Their bodies may be obſerved on the ground, near the hive. The queen that is choſen is of a more reddiſh colour than thoſe which are deſtroyed; ſo that fruitfulneſs ſeems to be a great motive of preference in bees; for the nearer they are to the time of laying their eggs, the bigger, larger, and more ſhining are their bodies.

For three or four nights before a ſwarm ſallies forth, there is in the hive a peculiar humming noiſe, of which authors give very different deſcriptions, probably owing to the ſtrength of imagination in each. Every ſound among bees ariſes from their ſtriking their wings againſt the air: their wings being their ſole organ of ſound, if we may be allowed the expreſſion. By moving their wings more or leſs forcibly and ſwiftly, they beat the air, and form the varied confuſed ſounds which we call humming. The noiſe which foretels their ſwarming is eaſily diſtinguiſhed by thoſe who are accuſtomed to it, and is more eſpecially obſerved before the caſts, or ſecond and following ſwarms. The hive appears ſo full of bees, that part of them hang in cluſters on the outſide; and the drones are perceived flying about in greater numbers than uſual. But the moſt certain ſign, and which indicates this event to be on that day, is, that the bees refrain from flying into the fields, though the ſeaſon ſeems inviting. Juſt before they take their flight, there is an uncommon ſilence in the hive, and this continues for ſome time: but as ſoon as one breaks forth, they all follow, and are inſtantly on the wing. They ſeldom ſwarm before the ſun has warmed the air; that is, not before ten in the morning, and ſeldom later than three in the afternoon; and the time of the year in which they moſt generally ſwarm, is from the middle of May to the end of June: but ſometimes ſooner or later, according as the ſeaſon is more or leſs favourable. The earlieſt ſwarms do not always prove the beſt, eſpecially if they are ſo early as the end of April or beginning of May: for the weather often is afterwards ſo wet and cold, that they are frequently in danger of being deſtroyed, or greatly reduced by famine. Though ſwarms which iſſue forth ſo late as July are not in danger of a preſent famine; yet, they ſcarcely have time and opportunity to lay in a ſufficient ſtore for the winter. Towards the ſeaſon of ſwarming, the door of the hive ſhould be enlarged, to give the bees the greater freedom to iſſue out; and it ſhould likewiſe remain ſo for young ſwarms, during the firſt fortnight or three weeks, to allow the freer entrance to the bees, at that time extremely buſy in collecting their neceſſary ſtores. The entrance ſhould afterwards be gradually leſſened, to prevent the otherwiſe eaſy acceſs of enemies, of which there is great danger, eſpecially as the autumn advances.

Hives continue ſometimes to ſend forth ſwarms till the old hive becomes too much weakened, and part of it is empty. It is probable, that the prolific young queens prompt the bees to ſwarm thus frequently: for it is certain that if there is not a young mother qualified to bring forth a numerous progeny, though there be ever ſo great a number of bees, they will all remain, and die rather than quit the hive.

Whenever the bees of a ſwarm fly too high, they are made to deſcend lower, and diſpoſed to ſettle, by throwing among them handfuls of ſand or duſt: probably the bees miſtake this for rain. It is uſual at the ſame time to beat on a kettle or frying-pan; perhaps from its being obſerved that the noiſe of thunder prompts ſuch bees as are in the field to return home. Precautions of this kind are the more neceſſary, if, as Dr. Warder, in his True Amazons, obſerves, "the bees always provide a place for their habitation before they ſwarm; either in ſome hollow tree, or in the hollow part of ſome old building, or in ſome deſerted hive, which the ſwarm have already prepared, by cleaning out whatever may be offenſive to their cleanly nature." Of this he gives an inſtance; and concludes, that "though they provide themſelves with a houſe before they ſwarm, and take much pains about it; yet if you are early enough in your taking the ſwarm, and they find themſelves at unawares in a convenient houſe, they have no mind generally to leave it: but if they riſe again the ſame or next day, be ſure hive them not in the ſame hive again, for it is plain they have ſome diſlike to it."

That the bees provide themſelves a habitation before they ſwarm, is a very juſt obſervation, a remarkable inſtance of which I was witneſs of at a gentleman's ſeat in Glouceſterſhire ſome years ago, where, walking in the garden in which were ſeveral bee-hives in the month of June, the bees were in full work, and paſſing in and out of the hives in great numbers, as is uſual in fine weather at that ſeaſon. In one hive only a very few bees were paſſing, and I was told it was an empty hive. I turned it up, and found it ſo, except a few bees near the crown of it, and the reaſon of their being there did not then occur to me: but next day a woman who lived in the neighbourhood, came running to the gardener, acquainting him, that ſhe had juſt loſt a ſwarm of bees ſhe had hived the evening before, which ſhe ſaw go off, and had followed them to the garden wall, and requeſted ſhe might be permitted to take them away, being perſuaded that they were lodged ſomewhere in the garden. Upon ſearch, a ſwarm was found in the hive that I had obſerved was empty the day before: ſome of the bees were in the hive, and the reſt at the mouth of it, on the outſide. In the evening the woman brought her hive, hived the bees in it a ſecond time and carried them home at night: but next morning they came off again, and ſettled as at firſt upon the old empty hive in the gentleman's garden. As it appeared by this that the woman's hive was diſagreeable to them, ſhe was allowed to carry the bees home in

the hive they had choſen for themſelves, which ſhe placed where ſhe had put them at firſt, and in this hive they remained quiet, and ſoon went to work.

I have related this, not only in confirmation of what is obſerved above, of bees providing a habitation for themſelves before they ſwarm, but alſo for another reaſon: for having once a pretty large apiary, conſiſting of common ſtraw hives, and boxes of various conſtructions, ſome of which happening to be empty, I found a ſwarm had taken poſſeſſion of one of them. After this I placed ſome empty hives every ſummer in my apiary, whereof one or more were commonly filled by ſwarms from my other hives, which ſaved the trouble of watching and hiving them. And ſometimes ſwarms would ſettle in them, that I knew not whence they came. In this way a perſon deſirous of having bees might obtain ſome, without any trouble, if the ſituation is good: by placing a few empty hives in readineſs for them, and many good ſwarms might be thus ſaved, that fix themſelves in hollow-trees, old walls, and other inacceſſible places, where they are of no uſe to any body. All the preparation neceſſary for theſe empty hives is, that they be very ſweet and perfectly clean, and the inſides well rubbed with a clean coarſe linen cloth, to break off the ſhort ſtraws, or other roughneſs in the hive. Some in dreſſing their hives, rub the inſides of them with ſweet herbs, and ſome with honey: but I made no other preparation, than rubbing off the ſhort ſtraws, and keeping them very clean. Bees are commonly put into ſtraw hives; and ſwarms ſeem to take to theſe more readily than to boxes, when left to their own choice.

As ſoon as the ſwarm is ſettled, the bees which compoſe it ſhould be got into a hive with all convenient ſpeed, to prevent their taking wing again. If they ſettle on a ſmall branch of a tree, eaſy to be come at, it may be cut off, and laid upon a cloth; the hive being ready immediately to put over them. If the branch cannot be conveniently cut, the bees may be ſwept from off it into a hive. Lodge but the queen in the hive, and the reſt will ſoon follow. If the bees muſt be conſiderably diſturbed, in order to get them into a hive, the moſt adviſable way is to let them remain in the place where they have pitched, till the evening, when there is leſs danger of their taking wing. If it be obſerved that they ſtill hover about the place they firſt alighted upon, the branches there may be rubbed with rue, or elder leaves, or any other thing diſtaſteful to them, to prevent their returning to it.

The hive employed on this occaſion ſhould be cleaned with the utmoſt care, and its inſide be rubbed very hard with a coarſe cloth, to get off the looſe ſtraws, or other impurities, which might coſt them a great deal of time and labour to gnaw away. It may then be rubbed with fragrant herbs or flowers, the ſmell of which is agreeable to the bees, or with honey.

The hive ſhould not be immediately ſet on the ſtool where it is to remain, but ſhould be kept near the place at which the bees ſettled, till the evening, leſt ſome ſtragglers ſhould be left. It ſhould be ſhaded, either with boughs, or with a cloth, that the too great heat of the ſun may not annoy the bees.

We ſometimes ſee a ſwarm of bees, after having left their hive, and even alighted upon a tree, return to their firſt abode. This never happens but when the young queen did not come forth with them, for want of ſtrength, or perhaps courage to truſt to her wings for the firſt time; or poſſibly from a conſciouſneſs of her not being impregnated.

Bees are not apt to ſting when they ſwarm: therefore it is not neceſſary then to take much extraordinary precaution againſt them. It is however adviſable for thoſe who are not accuſtomed to them, to cover their face and hands.

A ſecond ſwarm ſcarcely is, and much leſs are the ſubſequent ones, worth keeping ſingle; becauſe, being few in number, they cannot allow ſo large a proportion of working bees to go abroad in ſearch of ſtore, as more numerous ſwarms can, after having appointed a proper number for the various works to be done within. For this reaſon it is adviſable to unite two or more of theſe laſt or latter ſwarms into one hive, ſo as to procure a ſufficient number of bees in one hive. Bees ſometimes ſwarm ſo often, that the mother-hive is too much weakened. In this caſe, the ſwarms ſhould be reſtored back; and this ſhould alſo be done when a ſwarm produces a ſwarm the firſt ſummer, as it ſometimes does. The beſt way, indeed, is to prevent ſuch ſwarming, by giving the bees more room: though this, again, will not anſwer where there is a young pregnant queen; ſhe well knowing that her life is the forfeit of her remaing at home.

The uſual method of uniting ſwarms is very eaſy. Spread a cloth at night upon the ground cloſe to the hive in which the two caſts or ſwarms are to be united; lay a ſtick acroſs this cloth; then fetch the hive with the new ſwarm, ſet it over the ſtick, give a ſmart ſtroke on the top of the hive, and all the bees will drop down upon the cloth in a cluſter. This done, throw aſide the empty hive, take the other from off the ſtool, and ſet this laſt over the bees, who will ſoon aſcend into it, mix with thoſe already there, and become one and the ſame family. Others, inſtead of ſtriking the bees down upon the cloth, place with its bottom upmoſt the hive in which the united ſwarms are to live, and ſtrike the bees of the other hive down into it. The former of theſe hives is then reſtored to its natural ſituation, and the bees of both hives ſoon unite. If ſome bees ſtill adhere to the other hive, they may be bruſhed off on the cloth, and they will ſoon join their brethren. Or one may take the following method, which gives leſs diſturbance to the bees. Set with its mouth upmoſt the hive into which the young ſwarm has been put, and ſet upon it the other hive. The bees in the lower hive, finding themſelves in an inverted ſituation, will ſoon aſcend into the upper.

Though all writers acknowledge, that one of the queens is conſtantly ſlain on theſe occaſions, and generally a conſiderable number of the working bees; yet none of them, Columella excepted, has propoſed the eaſy remedy of killing the queen of the latter caſt or ſwarm before the union is made; a means by which the lives of the working bees may be preſerved. This may be done, either by intoxicating them, and then picking her out, or by ſearching her out when the bees are beaten down upon the cloth; for this being done in the night, to prevent the battle which might otherwiſe enſue, there will be no great difficulty in finding her.

A large ſwarm may weigh eight pounds, and ſo gradually leſs, to one pound: conſequently a very good one may weigh five or ſix pounds. All ſuch as weigh leſs than

than four pounds ſhould be ſtrengthened, by uniting to each of them a leſs numerous ſwarm. The ſize of the hive ſhould be proportioned to the number of the bees; and, as a general rule, it ſhould be rather under than over-ſized, becauſe bees require to be kept warmer than a large hive will admit of.

Columella directs, that the apiary, or bee-garden, face the ſouth, in a place neither too hot, nor too much expoſed to the cold; that it be in a valley, in order that the loaded bees may with the greater eaſe deſcend to their homes; that it be near the manſion-houſe, on account of the conveniency of watching them, but ſo ſituated as not to be expoſed to noiſome ſmells, or to the din of men or cattle; that it may be ſurrounded with a wall, which however ſhould not riſe above three feet high; that, if poſſible, a running ſtream be near them, or, if that cannot be, that water be brought near them, in troughs, with pebbles or ſmall ſtones in the water, for the bees to reſt on whilſt they drink; or that the water be confined within gently declining banks, in order that the bees may have ſafe acceſs to it; they not being able to produce either combs, honey, or food for their maggots, without water. That the neighbourhood of rivers or baſons of water with high banks be avoided, becauſe winds may whirl the bees into them, and they cannot eaſily get on ſhore from thence to dry themſelves; and that the garden, in which the apiary ſtands, be well furniſhed with ſuch plants as affords the bees plenty of good paſture. The trees of this garden ſhould be of the dwarf kind, and their heads buſhy, in order that the ſwarms which ſettle on them may be the more eaſily hived.

The proprietor ſhould be particularly attentive that the bees have alſo in their neighbourhood ſuch plants as yield them plenty of food. Columella enumerates many of theſe fitted to a warm climate: among them he mentions thime, the oak, the pine, the ſweet ſmelling cedar, and all fruit trees. Experience has taught us, that furz, broom, muſtard, clover, heath, buck-wheat, &c. are excellent for this purpoſe. Pliny recommends broom, in particular, as a plant exceedingly grateful, and very profitable to bees; and Mr. Bradley ſpeaks highly of the advantages which ariſe from the planting of it for the food of theſe uſeful inſects. *See the article* BROOM.

Plantations of muſtard, of the flowers of which bees are extremely fond, may be kept in bloom for ſeveral weeks running.

Great improvements may alſo certainly be made in the eſſential article of providing plenty of paſture for bees, whenever this ſubject ſhall be more carefully attended to than it, unfortunately, has hitherto been. A rich corn country is well known to be a barren deſert to them during the moſt conſiderable part of the year; and therefore the practice of other nations, in ſhifting the places of abode of their bees, well deſerves our imitation.

Columella informs us, that, as few places are ſo happily ſituated as to afford the bees proper paſture both in the beginning of the ſeaſon and alſo in the autumn, it was the advice of Celſus, that after the vernal paſtures are conſumed, the bees ſhould be tranſported to places abounding with autumnal flowers; as was practiſed by conveying the bees from Achaia to Attica, from Eubœa and the Cyclad iſlands to Scyrus, and alſo in Sicily, where they were brought to Hybla from other parts of the iſland. He likewiſe directs, that the hives be carefully examined before they are removed from one place to another, and to take out ſuch combs as appear old, looſe, or have moths in them, reſerving only thoſe that are ſound, in order that the hive may be ſtored with combs collected from the beſt flowers.

Mr. Maillet, in his curious deſcription of Egypt, relates, that "ſpite of the ignorance and ruſticity which have got poſſeſſion of that country, there yet remain in it ſeveral footſteps of the induſtry and ſkill of the ancient Egyptians. One of their moſt admirable contrivances is, their ſending their bees annually into diſtant countries, in order to procure them ſuſtenance there, at a time when they could not find any at home; and their afterwards bringing them back, like ſhepherds who ſhould travel with their flocks, and make them feed as they go. It was obſerved by the antient inhabitants of Lower Egypt, that all plants bloſſomed, and the fruits of the earth ripened, above ſix weeks earlier in Upper Egypt, than with them. They applied this remark to their bees; and the means then made uſe of by them, to enable theſe uſeful induſtrious inſects to reap advantage from the more forward ſtate of nature there, were exactly the ſame as are now practiſed, for the like purpoſe, in that country. About the end of October, all ſuch inhabitants of the Lower Egypt as have hives of bees, embark them on the Nile, and convey them upon that river quite into Upper Egypt; obſerving to time it ſo that they arrive there juſt when the inundat n s withdrawn, the lands have been ſown, and the flowers begin to bud. The hives thus ſent are marked and numbered by their reſpective owners, and placed pyramidically in boats prepared for the purpoſe. After they have remained ſome days at their fartheſt ſtation, and are ſuppoſed to have gathered all the wax and honey they could find in the fields within two or three leagues around, their conductors convey them, in the ſame boats, two or three leagues lower down, and there leave the laborious inſects ſo long time as is neceſſary for them to collect all the riches of this ſpot. Thus, the nearer they come to the place of their more permanent abode, they find the productions of the earth, and the plants which afford them food, forward in proportion. In fine, about the beginning of February, after having travelled through the whole length of Egypt, gathering all the rich produce of the delightful banks of the Nile, they arrive at the mouth of that river, towards the ocean; from whence they ſet out, and from whence they are now returned to their ſeveral homes: for care is taken to keep an exact regiſter of every diſtrict from whence the hives were ſent in the beginning of the ſeaſon, of their numbers, of the names of the perſons who ſent them, and likewiſe of the mark or number of the boat in which they were placed."

The author of the Natural Hiſtory of Bees gives the following account of what is practiſed in this way in France; an example well worthy our imitation in many parts of this kingdom. "M. Proutaut, ſays he, keeps a great number of hives. His ſituation is one of thoſe in which flowers become rare or ſcarce very ſoon, and where few or none are ſeen after the corn is ripened. He then ſends his bees into Beauce, or the Gatinois, in caſe it has rained in thoſe parts. This is a journey of about twenty miles, which he makes them take: but if he concludes that the bees could not meet in ei-

ther of thoſe countries, wherewith to employ themſelves advantageouſly, he then has them carried into Sologne about the beginning of Auguſt, as knowing that they will there meet with a great many fields of buck-wheat in flower, which will continue ſo till about the end of September. His method of tranſporting them is thus. His firſt care is, to examine thoſe hives, ſome of whoſe honey-combs might be broken or ſeparated by the jolting of the vehicle: they are made faſt one to the other, and againſt the ſides of the hive, by means of ſmall ſticks, which may be diſpoſed differently as occaſion will point out. This being done, every hive is ſet upon a packing-cloth, or ſomething like it, the threads of which are very wide: the ſides of this cloth are then turned up, and laid on the outſide of each hive, in which ſtate they are tied together with a piece of ſmall pack-thread wound ſeveral times round the hive. As many hives as a cart built for that purpoſe will hold, are afterwards placed in this vehicle. The hives are ſet two and two, the whole length of the cart. Over theſe are placed others; which make, as it were, a ſecond ſtory or bed of hives. Thoſe which are ſtored with combs ſhould always be turned topſy-turvy. It is for the ſake of their combs, and to fix them the better, that they are diſpoſed in this manner; for ſuch as have but a ſmall quantity of combs in them, are placed in their natural ſituation. Care is taken in this ſtowage, not to let one hive ſtop up another, it being eſſentially neceſſary for the bees to have air; and it is for this reaſon they are wrapped up in a coarſe cloth, the threads of which were wove very wide, in order that the air may have a free paſſage, and leſſen the heat which theſe inſects raiſe in their hives; eſpecially when they move about very tumultuouſly, as often happens in theſe carts. Thoſe uſed for this purpoſe in Yêvre, hold from thirty to forty-eight hives. As ſoon as all are thus ſtowed, the caravans ſet out. If the ſeaſon is ſultry, they travel only in the night; but a proper advantage is made of cool days. You will imagine that they do not ride poſt. The horſes muſt not be permitted even to trot; they are led ſlowly, and through the ſmootheſt roads. When there are not combs in the hives ſufficient to ſupport the bees during their journey, the owner takes the earlieſt opportunity of reſting them wherever they can collect wax. The hives are taken out of the cart, then ſet upon the ground, and after removing the cloth from over them, the bees go forth in ſearch of food. The firſt field they come to ſerves them as an inn. In the evening, as ſoon as they are all returned, the hives are ſhut up; and being placed again in the cart, they proceed in their journey. When the caravan is arrived at the journey's end, the hives are diſtributed in the gardens, or in fields adjacent to the houſes of different peaſants, who, for a very ſmall reward, undertake to look after them Thus it is that, in ſuch ſpots as do not abound with flowers at all ſeaſons, means are found to ſupply the bees with food during the whole year."

Theſe inſtances of the great advantages which attend ſhifting of bees in ſearch of paſture, afford an excellent leſſon to many places in this kingdom: they direct particularly the inhabitants of the rich vales, where the harveſt for bees ends early, to remove their ſtocks to places which abound in heath, this plant continuing in bloom during a conſiderable part of the autumn, and yielding great plenty of food to bees. Thoſe in the neighbourhood of hills and mountains will ſave the bees a great deal of labour, by taking alſo the advantage of ſhifting their places of abode.

We come now to explain the moſt inhuman method commonly practiſed of taking bees, which conſiſts in wantonly deſtroying the whole ſwarm, in order to enjoy the fruits of their labours.

Were we to kill the hen for her egg, the cow for her milk, or the ſheep for the fleece it bears, every one would inſtantly ſee how much we ſhould act contrary to our own intereſt: and yet this is practiſed every year in regard to bees. Would it not argue more wiſdom in us to be contented with taking away only a portion of their wax and honey, as is the practice of many countries? The common method here is, that when thoſe which are doomed for ſlaughter have been marked out (which is generally done in September) a hole is dug near the hive, and a ſtick, at the end of which is a rag that has been dipped in melted brimſtone, being ſtuck in that hole, the rag is ſet on fire, the hive is immediately ſet over it, and the earth is inſtantly thrown up all around, ſo that none of the ſmoke can eſcape. In a quarter of an hour, all the bees are ſeemingly dead; and they will ſoon after be irrecoverably ſo, by being buried in the earth that is returned back into the hole: I ſay, they will ſoon be abſolutely killed by this laſt means; becauſe it has been found, by experiment, that all the bees which have been affected only by the fume of the brimſtone, recover again, excepting ſuch as have been ſinged or hurt by the flame. Hence it is evident, that the fume of brimſtone might be uſed for intoxicating the bees, with ſome few precautions. The heavieſt and the lighteſt hives are alike treated in this manner; the former, becauſe they yield the moſt profit, with an immediate return; and the latter, becauſe they would not be able to ſurvive the winter. Thoſe hives which weigh from fifteen to twenty pounds, are thought to be the fitteſt for keeping.

The practice of the ancients was, however, very different from this: they were content to ſhare with theſe induſtrious inſects the produce of their labours; and ſome very laudable attempts have been made in our own country, to attain the deſirable end of getting the honey and wax without deſtroying the bees. John Geddy, Eſq; publiſhed in the year 1665, his invention of boxes for preſerving the lives of bees. Theſe were improved by Joſeph Warder, phyſician, at Croydon, who at the ſame time embelliſhed his account of the ſtructure and uſe of theſe boxes, with ſeveral other curious circumſtances concerning bees in his work intitled, The True Amazons, or the Monarchy of Bees. Two very worthy clergymen, the reverend Mr. John Thorley of Oxford, and the reverend Mr. Stephen White, M. A. rector of Holton in Suffolk, have brought the method of preſerving the lives of bees to ſtill greater perfection. We ſhall relate the opinions and practice of each, beginning with Mr. Thorley, who lived many years before Mr. White, and add to their accounts the beſt improvements that have been lately made in foreign countries.

Mr. Thorley, in his Enquiry into the Nature, Order, and Government of Bees, thinks, colonies preferable to hives, for the following reaſons. Firſt, the more certain preſervation of very many thouſands of theſe noble and uſeful creatures: Secondly, their greater ſtrength (which conſiſts in numbers) and conſequently their greater

greater ſafety from robbers: Thirdly, their greater wealth, ariſing from the united labours of the greater number. He tells us, that he has in ſome ſummers taken two boxes filled with honey from one colony, and yet ſufficient ſtore has been left for their maintenance during the winter, each box weighing forty pounds. Add to theſe advantages, the pleaſure of viewing them with the greateſt ſafety, at all ſeaſons, even in their buſieſt time of gathering, and their requiring a much leſs attendance in ſwarming time. The bees thus managed are alſo more effectually ſecured from wet and cold, from mice and other vermin.

His boxes are made of deal, which, being ſpungy, ſucks up the breath of the bees ſooner than a more ſolid wood would do. Yellow dram-deal, thoroughly ſeaſoned, is the beſt.

An octagon, being nearer to a ſphere, is better than a ſquare form: for as the bees, in winter, lie in a round body near the center of the hive, a due heat is then conveyed to all the out-parts, and the honey is kept from candying.

The dimenſions which Mr. Thorley, after many years experience, recommends for the boxes, are ten inches deep, and twelve or fourteen inches broad, in the inſide. He has tried boxes containing a buſhel or more, but found them not to anſwer the deſign like thoſe of a leſſer ſize.

The top of the box ſhould be made of an entire board, a full inch thick after it has been planed, and it ſhould project on all ſides at leaſt an inch beyond the dimenſions of the box. In the middle of this top there muſt be a hole five inches ſquare, for a communication between the boxes; and this hole ſhould be covered with a ſliding ſhutter, of deal or elm, running eaſily in a groove over the back window. The eight pannels, nine inches deep, and three quarters of an inch thick when planed, are to be let into the top ſo far as to keep them in their proper places; to be ſecured at the corners with plates of braſs, and to be cramped with wires at the bottom, to keep them firm: for the heat in ſummer will try their ſtrength. There ſhould be a glaſs window behind, fixed in a frame, with a thin deal cover, two ſmall braſs hinges, and a button to faſten it. This window will be ſufficient for inſpecting the progreſs of the bees. Two braſs handles, one on each ſide, are neceſſary, to lift up the box: theſe ſhould be fixed in with two thin plates of iron, near three inches long, ſo as to turn up and down, and put three inches below the top-board, which is nailed cloſe down with ſprigs to the other parts of the box.

Thoſe who chuſe a frame within, to which the bees may faſten their combs, need only uſe a couple of deal ſticks of an inch ſquare, placed acroſs the box, and ſupported by two pins of braſs; one an inch and a half below the top, and the other two inches below it; by which means the combs will quickly find a reſt One thing more, which perfects the work, is a paſſage four or five inches long, and leſs than half an inch deep, for the bees to go in and out at the bottom of the box.

Mr. Thorley, ſon to the above-mentioned clergyman, has improved his father's method of managing bees; and having been convinced from near ſixty years experience, that his bee-hives would be productive of much greater profit to the owners of bees, and alſo render that cruel and ungenerous practice of deſtroying theſe animals not only unneceſſary, but pernicious, preſented a bee-hive of this conſtruction to the Society of Arts, &c. in the Strand, who readily purchaſed another of his hives filled with honey, &c. that they might be inſpected by the curious, and brought into univerſal uſe; and from this bee-hive the view on Plate III. Fig. 8, was drawn. The Society, perſuaded that the invention would prove of the greateſt advantage to this country, publiſhed a premium of two hundred pounds, in order to introduce Mr. Thorley's, or ſome other method of a ſimilar kind, whereby much larger quantities of honey and wax might be procured, and, at the ſame time, the lives of theſe laborious and uſeful inſects preſerved.

The bottom part, marked *a*, is an octangular bee-box, made of deal boards, about an inch in thickneſs, the cover of which is about 17 inches in diameter, but the internal part only $15\frac{1}{2}$ and its height 10 inches. In the middle of the cover of this octangular box in a hole, which may be opened or ſhut at pleaſure, by means of a ſlider *d*. In one of the pannels is a pane of glaſs, covered with a wooden door, *e*. The entrance, *f*, at the bottom of the box is about three inches and a half broad, and half an inch high. Two ſlips of deal, about half an inch ſquare, croſs each other in the center of the box, and are faſtened to the pannels by means of ſmall ſcrews. To theſe ſlips the bees faſten their combs.

In this octangular box the bees are hived, after ſwarming in the uſual manner, and there ſuffered to continue till they have built their combs, and filled them with honey, which may be known from opening the door, and viewing their works through the glaſs-pane, or by the weight of the hive. When the bee-maſter finds his laborious inſects have filled their habitation, he is to place a common bee-hive of ſtraw, repreſented at *b*, made either flat at the top, or in the common form, on the octangular box, and draw out the ſlider, by which a communication will be opened between the box and the ſtraw-hive; the conſequence of which will be, that thoſe laborious inſects will fill this hive alſo with the product of their labours. When the bee-maſter finds the ſtraw-hive is well filled, he may puſh in the ſlider, and take it away, placing another immediately in its room, and then drawing out the ſlider. Theſe indefatigable creatures will then fill the new hive in the ſame manner. By proceeding in this method, Mr. Thorley aſſured the Society that he had taken three ſucceſſive hives, filled with honey and wax, from one ſingle hive, during the ſame ſummer; and that after he had laid his inſects under ſo large a contribution, the food ſtill remaining in the octangular box was abundantly ſufficient for their ſupport during the winter. He added, that if this method was purſued in every part of the kingdom, inſtead of that cruel method of putting the creatures to death, he was perſuaded, from long experience, that wax would be collected in ſuch plenty that candles might be made with it, and ſold as cheap as thoſe of tallow are at preſent.

Mr. Thorley has alſo added another part to his bee-hive, which cannot fail of affording the higheſt entertainment to a curious and inquiſitive mind. It conſiſts of a glaſs receiver, repreſented at D, eighteen inches in height, eight inches in diameter at the bottom, and in the greateſt part thirteen. This receiver has a hole at

the top, about an inch in diameter, through which a ſquare piece of deal E is extended nearly to the bottom of the veſſel, having two croſs bars to which the bees faſten their combs. When the bees have filled their ſtraw-hive, (which muſt have a hole in the center, covered with a piece of tin) Mr. Thorley places the glaſs *c* upon the top of the ſtraw-hive, and draws out the piece of tin: the bees, now finding their habitation enlarged, purſue their labours with ſuch alacrity, that they fill this glaſs hive likewiſe with their ſtores. And as this receptacle is wholly tranſparent, the curious obſerver may entertain himſelf with viewing the whole progreſs of their works. One of the hives, now depoſited at the Society's rooms in the Strand, is filled with the produce of the labours of thoſe inſects; and the glaſs-hive is ſuppoſed to contain about thirty-eight pounds of honey.

It will, however, be neceſſary to cover the glaſs with an empty hive of ſtraw, or at leaſt with a cloth, which may be eaſily removed when you inſpect your bees, leſt too much light prevent your inſects from working.

When the glaſs is completely filled, ſlide a tin-plate between it and the hive or box, ſo as to cover the paſſage, and in half an hour the glaſs may be taken off with ſafety. What few bees remain in it, will readily go to their companions. He then very obligingly offers his ſervice and farther information to any gentleman or lady whoſe curioſity may incline them to inſpect his apiary. He has added a glaſs window to his ſtraw-hives, in order to ſee what progreſs the bees make; which is of ſome importance, eſpecially if one hive is to be taken away whilſt the ſeaſon ſtill continues favourable for their collecting of honey: for when the combs are filled with honey, the cells are ſealed up, and the bees forſake them, and reſide moſtly in the hive in which their works are chiefly carried on. Obſerving alſo, that the bees were apt to extend their combs through the paſſage of communication into the upper hive, whether glaſs or other, which rendered it neceſſary to divide the comb when the upper hive was taken away, he now puts in that paſſage a wire-ſcreen, or netting, the meſhes of which are large enough for a loaded bee to go eaſily thro' them, this prevents the joining of the combs from one box to the other, and conſequently obviates the neceſſity of cutting them, and of ſpilling ſome honey, which, running down amongſt a croud of bees, uſed before to incommode them much; it being difficult for them to clear their wings of it.

The reverend Mr. Stephen White, rector of Holton in Suffolk, informs us, that his fondneſs for theſe little animals ſoon put him upon endeavouring, if poſſible, to ſave them from *fire* and *brimſtone*; that he thought he had reaſon to be content to ſhare their labours for the preſent, and great reaſon to rejoice if he could at any time preſerve their lives, to work for him another year; and that the main drift of his obſervations and experiments has therefore been, to diſcover an eaſy and cheap method, ſuited to the abilities of the common people, of taking away ſo much honey as can be ſpared, without deſtroying or ſtarving the bees, and by the ſame means to encourage ſeaſonable ſwarms.

In his directions how to make the bee-boxes of his inventing, he tells us, ſpeaking of the manner of conſtructing a ſingle one, that it may be made of deal or any other well ſeaſoned boards which are not apt to warp or ſplit. The boards ſhould be near an inch thick: the figure of the box ſquare, and its heighth and breadth nine inches and five eighths every way, meaſuring within. With theſe dimenſions it will contain near a peck and an half. The front part muſt have a door cut in the middle of the bottom edge, three inches wide, and near half an inch in height, which will give free liberty to the bees to paſs through, yet not be large enough for their enemy the mouſe to enter. In the back part you muſt cut a hole with a rabbet in it, in which you are to fix a pane of the cleareſt and beſt crown-glaſs, about five inches in length, and three in breadth, and faſten it with putty: let the top of the glaſs be placed as high as the roof within-ſide, that you may ſee the upper part of the combs, where the bees with their riches are moſtly placed. You will, by this means, be better able to judge of their ſtate and ſtrength, than if your glaſs was fixed in the middle. The glaſs muſt be covered with a thin piece of board, by way of ſhutter, which may be made to hang by a ſtring, or turn upon a nail, or ſlide ſideways between two mouldings. Such as are deſirous of ſeeing more of the bees works, may make the glaſs as large as the box will admit, without weakening it too much: or they may add a pane of glaſs on the top, which muſt likewiſe be covered with a ſhutter, faſtened down with pegs to prevent accidents.

The ſide of the box which is to be joined to another box of the ſame form and dimenſions, as it will not be expoſed to the external air, may be made of a piece of ſlit deal not half an inch thick. This he calls the ſide of communication, becauſe it is not to be wholly incloſed: a ſpace is to be left at the bottom the whole breadth of the box, and a little more than an inch in height, and a hole or paſſage is to be made at top, three inches long, and more than half an inch wide. Through theſe the bees are to have a communication from one box to the other. The lower communication being on the floor, our labourers, with their burthens, may readily and eaſily aſcend into either of the boxes. The upper communication is only intended as a paſſage between the boxes, reſembling the little holes, or narrow paſſes, which may be obſerved in the combs formed by our ſagacious architects, to ſave time and ſhorten the way when they have occaſion to paſs from one comb to another; juſt as, in populous cities, there are narrow lanes and alleys, paſſing tranſverſly from one large ſtreet to another.

In the next place you are to provide a looſe board, half an inch thick, and large enough to cover the ſide where you have made the communication. You are likewiſe to have in readineſs ſeveral little iron ſtaples, an inch and half long, with the two points or ends bended down more than half an inch. The uſe of theſe will be ſeen preſently.

You have now only to fix two ſticks croſſing the box from ſide to ſide, and croſſing each other, to be a ſtay to the combs; one about three inches from the bottom, the other the ſame diſtance from the top; and when you have painted the whole, to make it more durable, your box is finiſhed.

The judicious bee-maſter will here obſerve, that the form of the box now deſcribed is as plain as is poſſible for it to be. It is little more than five ſquare pieces of board nailed

nailed together; ſo that a poor cottager, who has but ingenuity enough to ſaw a board into the given dimenſions, and to drive a nail, may make his own boxes well enough, without the help or expence of a carpenter.

No directions are neceſſary for making the other box, which muſt be of the ſame form and dimenſions. The two boxes differ from each other only in this, that the ſide of communication of the one muſt be on your right-hand, of the other on the left. Plate III. Fig. 9, repreſents two of theſe boxes, with their openings of communication, ready to join to each other.

Mr. White's manner of hiving a ſwarm into one or more of theſe boxes, is thus:

You are to take the looſe board, and faſten it to one of the boxes, ſo as to ſtop the communications. This may be done by three of the ſtaples before-mentioned; one on the top of the box near the front, the two others on the back, near the top and near the bottom. Let one end of the ſtaple be thruſt into a gimblet-hole made in the box, ſo that the other end may go as tight as can be over the looſe board, to keep it from ſlipping when it is handled. The next morning, after the bees have been hived in this box, the other box ſhould be added, and the looſe board ſhould be taken away. This will prevent a great deal of labour to the bees, and ſome to the proprietor.

Be careful to faſten the ſhutter ſo cloſe to the glaſs, that no light may enter through it; for the bees ſeem to look upon ſuch light, as a hole or breach in their houſe, and on that account may not ſo well like their new habitation. But the principal thing to be obſerved at this time, is to cover the box, as ſoon as the bees are hived, with a linen-cloth thrown looſely over it, or with green boughs, to protect it from the piercing heat of the ſun. Boxes will admit the heat much ſooner than ſtraw-hives; and if the bees find their houſe too hot for them, they will be wiſe enough to leave it. If the ſwarm be larger than uſual, inſtead of faſtening the looſe board to one box, you may join two boxes together with three ſtaples, leaving the communication open from one to the other, and then hive your bees into both. In all other reſpects, they are to be hived in boxes after the ſame manner as in common hives; which being well known, it were needleſs here to give particular directions concerning it.

The door of the ſecond box ſhould be carefully ſtopped up, and be kept conſtantly cloſed, in order that the bees may not have any entrance but through the firſt box.

When the boxes are ſet in the places where they are to remain, they muſt be ſcreened from the ſummer's ſun, becauſe the wood will otherwiſe be heated to a greater degree than either the bees or their works can bear; and they ſhould likewiſe be ſcreened from the winter's ſun, becauſe the warmth of this will draw the bees from that lethargic ſtate which is natural to them, as well as to many other inſects, in the winter ſeaſon. For this purpoſe, and alſo to ſhelter the boxes from rain, our ingenious clergyman has contrived the following frame.

Plate III. Fig. 10. repreſents the front of a frame for twelve colonies, *a*, *a*, are two cells of oak, lying flat on the ground, more than four feet long. In theſe cells you are to fix four oaken poſts, about the thickneſs of ſuch as are uſed for drying linen.

The two poſts *b*, *b*, in the front, are about ſix feet two inches above the cells: the other two ſtanding backward, five feet eight inches.

You are next to nail ſome boards of ſlit deal horizontally from one of the fore-poſts to the other, to ſcreen the bees from the ſun. Let theſe boards be ſeven feet ſeven inches in length, and nailed to the inſide of the poſts, and be well ſeaſoned, that they may not ſhrink or gape in the joints.

c, *c*, are two ſplines of deal, to keep the boards even, and ſtrengthen them.

Plate III. Fig. 11. repreſents the back of the frame. *d*, *d*, *d*, *d*, are four ſtrong boards of the ſame length with the frame, on which you are to place the boxes. Let the upper ſide of them be very ſmooth and even, that the boxes may ſtand true upon them: or it may be ſtill more adviſable, to place under every pair of boxes a ſmooth thin board, as long as the boxes, and about a quarter of an inch wider. The bees will ſoon faſten the boxes to this board, in ſuch manner, that you may move or weigh the boxes and board together, without breaking the wax or reſin, which for many reaſons ought to be avoided. Theſe floors muſt be ſupported by pieces of wood, or bearers *e*, *e*, &c. which are nailed from poſt to poſt at each end. They are likewiſe to be well nailed to the frame, to keep them from ſinking with the weight of the boxes.

f repreſents the roof, which projects backward about ſeven or eight inches beyond the boxes, to ſhelter them from rain.

You have now only to cut niches or holes in the frame, over againſt each mouth or entrance into the boxes, at *h*, *h*, *h*, in Fig. 10. Let theſe niches be near four inches long; and under each you muſt nail a ſmall piece of wood for the bees to alight upon.

The morning or evening ſun will ſhine upon one or both ends of the frame, let its aſpect be what it will: but you may prevent its over-heating the boxes, by a looſe board ſet up between the poſts, and kept in by two or three pegs.

The ſame gentleman, with great humanity, obſerves, that no true lover of bees ever lighted the fatal match without concern; and that it is evidently more to our advantage, to ſpare the lives of our bees, and be content with part of their ſtores, than to kill and take poſſeſſion of the whole.

About the latter end of Auguſt, ſays he, by a little inſpection through your glaſſes, you may eaſily diſcover which of your colonies you may lay under contribution. Such as have filled a box and a half with their works, will pretty readily yield you the half box. But you are not to depend upon the quantity of combs, without examining how they are ſtored with honey. The bees ſhould, according to him, have eight or nine pounds left them, by way of wages for their ſummer's work.

The moſt proper time for this buſineſs is the middle of the day: and as you ſtand behind the frame, you will need no armour, except a pair of gloves. The operation itſelf is very ſimple, and eaſily performed, thus: open the mouth of the box you intend to take; then with a thin knife, cut through the reſin with which the bees have joined the boxes to each other, till you find that you have ſeparated them; and after this thruſt a ſheet of tin gently in between the boxes. The communication being thereby ſtopped, the bees in the fulleſt box, where moſt likely the queen is, will be a little diſturbed at the operation; but thoſe in the other box, where we ſuppoſe the queen is not, will run to and fro in the utmoſt hurry and confuſion, and ſend forth a mournful cry,

eaſily

eaſily diſtinguiſhed from their other notes. They will iſſue out at the newly opened door; not in a body, as when they ſwarm, nor with ſuch calm and chearful activity as when they go forth to their labours; but by one or two at a time, with a wild flutter, and viſible rage and diſorder. This, however, is ſoon over; for as ſoon as they get abroad, and ſpy their fellows, they fly to them inſtantly, and join them at the mouth of the other box. By this means, in an hour or two, for they go out ſlowly, you will have a box of pure honey, without a living bee in it to moleſt you; and likewiſe without dead bees, which, when you harm them, are often mixed with your honey, and both waſte and damage it.

Mr. White's boxes are very convenient not only for taking away part of the honey, without breaking the combs, without killing any of the bees, or much diſturbing them, but alſo on two other accounts: firſt, for feeding weak ſwarms, or ſuch whoſe ſtock of proviſion is exhauſted, and require to be fed to keep them alive. The uſual methods of feeding them with ſugar, and other ſubſtances being often ineffectual; and even honey is in ſome degree ſo alſo, for ſeveral reaſons, but principally becauſe the natural food of bees is not honey alone; and whether bee bread, or whatever elſe, is their food, they have it ready prepared for them, by adding a box to their ſtore, that was taken from them, or ſome of the colonies, in autumn; for ſome of theſe boxes, full of combs, ſhould be kept entire, and given them when their own ſtore is exhauſted. A colony of theſe boxes is alſo very conveniently, and with little trouble, cleared of moths, or other inſects, that are pernicious or troubleſome to the bees; for the boxes may be taken away from the colony ſingly; and after the moths, &c. are deſtroyed, may be immediately returned to the colony.

The indefatigable Mr. Wildman has obliged the world with the following method of taking the wax and honey, without deſtroying the bees:

Remove, ſays he, the hive from which you would take the wax and honey into a room, into which admit but little light, that it may at firſt appear to the bees as if it were late in the evening. Gently invert the hive, placing it between the frames of a chair, or other ſteady ſupport, and cover it with an empty hive, keeping the ſide next the window of the empty hive raiſed a little to give the bees ſufficient light to get into it. While you hold the empty hive ſteadily ſupported on the edge of the full hive, between your ſide and your left arm, keep ſtriking with your other hand all round the full hive from top to bottom, in the manner of beating a drum, ſo that the bees may be frightened by the continual noiſe from all quarters; and they will, in conſequence, mount out of the full hive into the empty one. Repeat the ſtrokes rather quick than ſtrong round the hive, till all the bees are got out of it, which will generally be in about five minutes. It is to be obſerved, that the fuller the hive is of bees, the ſooner they will have left it. As ſoon as a number of them have got into the empty hive, it ſhould be raiſed a little from the full one, that the bees may not continue to run from the one to the other. And as ſoon as all the bees are out of the full hive, the other, in which the bees are, muſt be placed on the ſtand from which the former hive was taken, in order to receive the abſent bees as they return from the fields.

If this be done early in the ſeaſon, the operator ſhould examine the royal cells; for if any of them contain young bees, they muſt, as well as all the combs that have young bees in them, be ſaved in the hive. Take out the other combs with a long broad and pliable knife; cutting them from the ſides and crown as clean as poſſible, to ſave the future labours of the bees, who muſt lick up the honey ſpilt, and remove every grain of wax. The ſides of the hive ſhould then be ſcraped with a table ſpoon, to clear away what was left by the knife.

Having thus finiſhed taking the wax and honey, let a table, covered with a clean cloth, be placed near the ſtand, and giving the hive in which the bees are a ſudden ſhake, ſtriking it at the ſame time pretty forcibly, the bees will be ſhaken on the cloth. Put their own hive over them immediately, raiſed a little on one ſide, that the bees may the more eaſily enter; and, when all are entered, place it on the ſtand as before. If the hive, in which the bees are, be turned uppermoſt, and their own hive placed over it, the bees will immediately aſcend into it, eſpecially if the lower ſides be ſtruck to alarm them: for the effects of fear impreſſed on the bees, by the continual noiſe, renders them for a conſiderable time ſo mild and tractable, that they will bear any handling, which does not hurt them, without any ſhew of reſentment.

Madame Vicat, a very ingenious lady in Swiſſerland, publiſhed in the Memoirs of the Berne Society for the year 1764, very judicious obſervations on bees and hives, particularly thoſe which are added one to another in the manner above deſcribed. Her remarks will deſerve our attention; and therefore we ſhall give here her own account of them.

On the ninth of June 1761, this lady bought an hive of bees, in a ſtraw hive. The combs were emptied of their honey, and thereby rendered the more liable to be attacked by the moth. She placed it in a little garden in the heart of the city of Lauſanne. She ſoon diſcovered there were moths in it, and that the bees had lice on them, which determined her to place a glaſs hive over the ſtraw one, and to ſhut up the opening into the lower hive. She frequently looked into the glaſs hive, to ſee what paſſed in it. The bees never ſtopped in it, and it ſerved only as a thoroughfare to the ſtraw hive. The bees, though very laborious and numerous, could not defend themſelves againſt the moths, which multiplied daily: on the eighteenth of July her bees were reduced to little more than three hundred. Finding their number decreaſe every day, ſhe ſuſpected that ſome accident had happened to the queen, which upon examination ſhe found to be true; as ſhe alſo did, that theſe moths may ſoon deſtroy the moſt numerous hive. They had mouldered away the wax, and had united the three middle combs, by their galleries, to ſuch a degree, that they appeared but as one maſs. Upon turning up the hive, to ſee what condition it was in, ſhe found the ſides covered with white and hard cocoons, which would ſoon produce moths. They were in ſuch quantity as to fill the crown of her hat.

It appears to her that the moths are moſt ready to attack hives which have ſwarmed oftener than once; becauſe in them the combs, in which the young bees were reared, being empty, ſerve for both ſhelter and food to their maggots, which feed only on wax. For the ſame reaſon, late ſwarms, and hives in which there is not much honey, are equally expoſed to theſe inſects. Such

hives

hives ſhould therefore be cleaned at leaſt once a week. If moths are found on the ſtool of the hive, it ſhould be cleaned every morning. In order to do this the more eaſily, without diſturbing the bees, or running the hazard of being ſtung by them, ſhe cauſed a large ſquare hole to be made in the ſtools on which her bees ſtand, with a ſlider underneath, fitted to it. By this means ſhe preſerved another hive, which ſhe had placed in the ſame garden on the ſame day, June 9, 1761: and though it was a ſwarm put into a new ſtraw hive, ſhe obſerved moths in it by the end of July. She calls this hive Numb. 1.

When ſhe ſecured this hive for the winter, ſhe put it into a dry room; but the air there being too mild, the bees conſumed almoſt their whole ſtore. She drew the ſlider often; for the diſaſter which happened to her other hive rendered her now more attentive, and ſhe generally found a quantity of moths on it. The combs became mouldy, which ſhe endeavoured to wipe off with ſoft brown paper, and rubbed it off the ſides of the hive with a napkin. So many bees died during the winter, that the hive became very weak in compariſon to what it was in the autumn. About the middle of March, ſhe placed it in a little garden ſurrounded with houſes.

She placed near the former a ſwarm of June 1761, which had been kept in a hive of Mr. Paltau's conſtruction, and had ſtood the preceding ſummer in the country, and the winter in a green-houſe in town, where the air was conſtantly kept temperate. Few of theſe bees died. She calls this hive Numb. 2.

That ſhe might judge of the ſtrength of theſe hives, ſhe counted the bees which entered into each of them in a quarter of an hour, taking the ſame hour of a fine day. She repeated this during ſeveral weeks, and found that about ſix hundred and ſixty entered in Numb. 2, and two hundred, or ſometimes two hundred and twenty, in the ſame time, into Numb. 1.

In May, the numbers of bees were ſo much increaſed, that it was no longer poſſible to count them. Numb. 1. was now as well ſtocked with bees as Numb. 2. She had been particularly careful of the former, and had fed them with honey in rainy weather. She had cleaned the ſlider every morning, and often found on it even four moths at a time. She thinks that the bees can eaſily pull them out of their holes before their galleries have been ſtrengthened with croſs threads, and cemented with the crumbs of wax, or their excrements. The bees do not always carry them out of the hive, but ſometimes leave them on the ſtool, where the little maggots ſoon weave a caſe to conceal themſelves in; as ſhe has known them do in a few hours. She found the greateſt number of them at about four or five o'clock in the morning.

She reſolved to place over Numb. 1. a glaſs hive, to give the bees an opportunity of working in it. With this view, ſhe cut ſome rounds of the top of the ſtraw hive, ſo as to make an opening of four inches, upon which ſhe put a piece of board with a correſponding opening of four inches; and on the twenty-fifth of March 1762, a glaſs hive was placed over it. She ſhut up the mouth of the ſtraw hive, in order to oblige the bees to enter by an opening under the glaſs hive, which ſhe covered, leſt the cold might incommode or even kill her bees, which were few in number. Though they increaſed ſo much by May as to be equal with Numb. 2. yet the bees never ſtopped in the glaſs hive. She judged from this, that they would rather deſcend, if ſhe gave them a convenient habitation below. She therefore placed under the ſtraw hive a box, which had an opening in it of eight inches, for the bees to paſs through. They ſoon extended their works downward, ſo that in a fortnight they almoſt filled the box with combs. On the eighth of July ſhe took away the glaſs hive; and though it had hitherto ſerved them only as a paſſage, they were much diſconcerted when it was removed: for after ſhe had filled up the opening in the top of the ſtraw hive with flax and rue, the loaded bees continued for ſeveral days to fly round it, though the rue was diſagreeable to them, before they would enter by the opening in the box, which was the only one they now had.

It is very remarkable, that the bees made no combs in the glaſs hive, though they were ſo fond of entering by it; and yet they deſcended into the box as ſoon as it was placed under them. We might have imagined it to be eaſieſt for them to enter below, at the bottom of the box; but inſtead of ſo doing, they entered by the glaſs hive, paſſed through the ſtraw hive full of combs, and carried their load down into the box. This gave her the firſt hint, that it was moſt adviſable to put the additional hive into which we would have the bees to work, under the full one, and ſhe has ſince found it ſucceed accordingly.

On the twentieth of July, ſhe found that the bees of Numb. 1. had caſt out ſo great a quantity of their young brood, that ſhe gathered ſome handfuls of it about the hive. The bees continuing to do the ſame next day, ſhe determined to take away the ſtraw hive the day after. For this purpoſe, ſhe choſe eight o'clock in the morning, which ſhe had obſerved to be the time when the greateſt number of bees were gone into the fields. She began by looſening the ſtraw hive from the board on which it reſted, and to which the bees had faſtened it with propolis. She then took the wadding out of the hole in the top of the ſtraw hive; near to which ſome linen rags were kept ſmoaking, and this ſmoke was blown into the hive by a pair of bellows. As ſoon as ſhe judged that moſt of the bees had been forced down into the box, ſhe cauſed a ſtrong iron wire to be drawn through between the hive and the board it reſted on, thereby to cut tranſverſely all the combs which were extended from the hive into the box through the hole of communication. The hive was then taken up with all the combs but one, which ſeparated from the middle of the hive. She carried this comb, with two fingers of each hand, to a table at ſome diſtance, on which the hive had been placed, bottom up. The comb which ſhe carried was almoſt covered with bees; and as it fell from the middle of the hive, where the queen generally reſides, ſhe ſearched for her, and found her on the firſt round of the hive, ſcarce able to crawl, being daubed with honey which had flowed from the combs cut through. She waſhed her in a glaſs of water; but finding that this did not entirely carry off the honey which ſtill adhered to her wings, ſhe waſhed her a ſecond time, and put her among ſeveral bees which had alſo been waſhed, but had recovered ſtrength enough to aſſiſt their queen. They immediately ſet themſelves to dry and aſſiſt her. She kept her thus for half

an hour, in the preſence of ſeveral curious perſons, who had often ſought in vain for her. As ſoon as ſhe thought her able to make uſe of her legs and wings, ſhe carried her to the ſtool on which the box remained, now to become the only habitation of the bees. Here ſhe was again bruſhed and licked during an hour, by bees which were in great numbers on the forepart of the box, and at laſt ſhe entered.

A farmer with whom this lady kept ſome bees in the country had an old ſtraw hive, which he intended to deſtroy in order to come at their honey and wax. She propoſed to him to follow the ſame ſteps as ſhe had taken with her's, which he agreed to, knowing that he could not loſe any thing by it. Having been taught by experience, ſhe adviſed him to put a box under the hive, rather than a hive over it. As ſhe had obſerved that her own bees had ſo obſtinately adhered to their former paſſage, ſhe adviſed him to place the box at a ſmall diſtance from the place where the hive had ſtood, that the whole might be the newer to them. They ſet to work heartily on the third of July; and by the ſixteenth of Auguſt they had lain in ſo much proviſion, that ſhe determined to take off the hive in the ſame manner as ſhe had done her own. The honey did not run ſo much, becauſe the weather was not ſo hot.

Whatever pains are taken to drive the bees out of the hive by means of ſmoke, many ſtill remain in it. In order to preſerve theſe bees, ſhe found that the beſt way was to ſweep them with the wing of a fowl into a tub of water, as faſt as the combs were taken out. This practice was attended with ſeveral advantages. It prevented the people being ſtung, it cleared the bees of any honey that might have dropped on them, and it made many of their lice fall off them.

In order to take them out of the water, ſhe cauſed a thin linen cloth to be ſpread over the mouth of an empty tub, in ſuch manner that it hung every where over the brim, and was held by one perſon, whilſt another poured the water, in which the bees were, gradually through it. The bees remained on the cloth It is eſſential that the quantity of water be large in proportion to the number of bees, and that they be quite ſenſeleſs before they are taken out. If the firſt water taſtes of honey, they ſhould be bathed in a ſecond quantity. M de Reaumur loſt many bees by not attending to this precaution. When the bees have been ſufficiently bathed, madam Vicat ſpreads them on whited brown paper, which, with the warm air, ſoon dries them.

It was ſome time before this lady could find the queen of the farmer's hive. The country people who ſaw the operation, were ſtruck with great compaſſion on ſeeing ſo many bees laid out, as it were, upon the table; for they thought them quite dead, and could not believe her when ſhe aſſured them that they would all return to life. By the time ſhe had found the queen, many of the bees had ſo far recovered, as to take care of her. Madam Vicat obſerved on her crocelet a louſe, which ſhe ſtruck off with a pin. She ſaw a ſecond on the hind part of her head; but it ſtuck ſo faſt that ſhe could not remove it; nor was ſhe much ſolicitous about it, becauſe the queen ſeemed to be in good plight. All the bees were placed on the ſtool before the box; and ſhe was informed next day, that they had all ſoon returned to their companions. Having obſerved in the combs ſome cells which had young in them, ſhe put an additional height under the box, in which ſhe placed the combs with the young in them: and remarking on the twentieth of Auguſt, that there were ſeveral moths under the laſt addition, in which the combs with young were placed, ſhe judged it not to be right to preſerve ſuch combs for the future. Experience has ſince confirmed her in this opinion.

It is generally alledged, that the moths get ſo much the upperhand in the hives by the fourth year, that it is neceſſary to deſtroy the bees on the third year, in order to get the then remaining honey and wax; for that all would otherwiſe fall a prey to the moths. Madam Vicat has now ſhewn, that hives may be preſerved from moths without condemning to the fire thoſe precious labourers, the bees; a practice as barbarous as it is ſenſeleſs; a practice which was ſtrictly forbidden by a Grand Duke of Tuſcany, under the penalty of ſevere puniſhment, as we are informed by M. de Réaumur. If care is not taken, even three years will be too long a time to allow; for the moths will frequently deſtroy a hive the very firſt year.

The lice which ſtick to bees are not generally thought to be prejudicial to them; and this may be true when there are but few of thoſe vermin; but when every bee in a hive has two, or perhaps three lice upon it, as is often the caſe, we may believe that the bees are greatly incommoded by them: indeed we may be aſſured of it, by their uſing every means in their power, though ineffectual, to get rid of them. M. de Réaumur declares, that he cannot think well of a hive in which the greateſt number of bees have lice on them.

Madam Vicat had a hive near a chair in her garden, in which ſhe uſed to ſit at work for hours. She one day ſaw many bees endeavouring to rid themſelves of theſe troubleſome enemies, and endeavoured, but to little purpoſe, to aſſiſt them, by killing the lice with her ſciſſars. Recollecting that tobacco is a poiſon to many inſects, ſhe immediately ſtrewed a little Morocco tobacco over ſome bees which had lice on them. The lice fell off inſtantly, as dead. In order to be aſſured that tobacco did not hurt the bees, ſhe confined ſome which were louſy, under a glaſs placed on paper ſtrewed with tobacco. After the bees had paſſed ſeveral times over the tobacco, the lice fell off them dead. She left the bees in the glaſs three hours, and at the end of that time they appeared vigorous and well.

Mr. Thorley tells us, that the beſt time to plant colonies of bees, is either in ſpring with new ſtocks full of bees, or in ſummer with ſwarms. If ſwarms are uſed, procure, if poſſible, two of the ſame day; hive them either in two boxes, or in a hive and a box; at night place them in the bee-houſe, one over the other, and, with a knife and a little lime and hair, ſtop cloſe the mouth of the hive, or upper-box, ſo that not a bee may be able to go in or out, but at the front door. This done, you will, in a week or ten days, with pleaſure ſee the combs appear in the boxes; but if it be an hive, nothing can be ſeen till the bees have wrought down into the box. Never plant a colony with a ſingle ſwarm, as Mr. Thorley ſays he has ſometimes done, but with little ſucceſs.

When the ſecond box, or the box under the hive, appears full of bees and combs, it is time to raiſe your colony. This ſhould be done in the duſk of the evening, and in the following manner.

Place

Place your empty box, with the ſliding ſhutter drawn back, behind the houſe, near the colony that is to be raiſed, and at nearly the height of the floor; then lifting up the colony with what expedition you can, let the empty box be put in the place where it is to ſtand, and the colony upon it, and ſhut up the mouth of the then upper box, with lime and hair as before directed.

When, by the help of the windows in the back of the boxes, you find the middle box full of combs, and a quantity of honey ſealed up in it, the loweſt box half full of combs, and few bees in the uppermoſt box, proceed thus.

About five o'clock in the afternoon, drive cloſe, with a mallet, the ſliding ſhutter under the hive or box that is to be taken from the colony. If the combs are new, the ſhutter may be forced home without a mallet; but be ſure it be cloſe, that no bees may aſcend into the hive or box to be removed. After this, ſhut cloſe the doors of your houſe, and leave the bees thus cut off from the reſt of their companions for the ſpace of half an hour or more. In this time, having loſt their queen, they will fill themſelves with honey, and be impatient to be ſet at liberty.

If, in this interval, you examine the box or boxes beneath, and obſerve all to be quiet in them, you may be confident that the queen is there, and in ſafety. Hereupon raiſe the back part of the hive or box ſo far, by a piece of wood ſlipped under it, as to give the priſoners room to come out, and they will return to their fellows: then lifting the box from off the colony, and turning it bottom upmoſt, cover it with a cloth all night; and the next morning, when this cloth is removed, the bees that may have remained in it will return to the colony. Thus you have a hive or box of honey, and all your bees ſafe.

Mr. Thorley adds, that the method he has purſued with great ſucceſs for many years, and which he recommends to the public, as the moſt effectual for preſerving bees in common hives, is incorporation, or uniting two ſtocks into one, by the help of a peculiar fume or opiate, which will put them intirely in your power for a time, to divide and diſpoſe of at pleaſure. But as that dominion over them will be of ſhort duration, you muſt be expeditious in this buſineſs.

The queen is immediately to be ſearched for, and killed. Hives which have ſwarmed twice, and are conſequently reduced in their numbers, are the fitteſt to be joined together, as this will greatly ſtrengthen and improve them. If a hive which you would take is both rich in honey, and full of bees, it is but dividing the bees into two parts, and putting them into two boxes, inſtead of one. Examine whether the ſtock to which you intend to join the bees of another, have honey enough in it to maintain the bees of both: it ſhould weigh full twenty pounds.

The narcotic, or ſtupefying fume, is made with the *fungus maximus* or *pulverulentus*, the large muſhroom, commonly known by the name bunt, puckfiſt, or frog-cheeſe. It is as big as a man's head, or bigger: when ripe, it is of a brown colour, turns to powder, and is exceeding light. Put one of theſe pucks into a large paper, preſs it therein to two-thirds, or near half the bulk of its former ſize, and tie it up very cloſe; then put it into an oven ſome time after the houſhold bread has been drawn, and let it remain there all night: when it is dry enough to hold fire, it is fit for uſe. The manner of uſing it is thus:

Cut off a piece of the puck, as large as a hen's egg, and fix it in the end of a ſmall ſtick ſlit for that purpoſe, and ſharpened at the other end, which place ſo that the puck may hang near the middle of an empty hive. This hive muſt be ſet with the mouth upward, in a pail or bucket, which ſhall hold it ſteady, near the ſtock you intend to take. This being done, ſet fire to the puck, and immediately place the ſtock of bees over it, tying a cloth round the hives, that no ſmoke may come forth. In a minute's time, or little more, you will hear the bees fall like drops of hail into the empty hive. You may then beat the top of the full hive gently with your hand, to get as many of them as you can: after this, looſing the cloth, lift the hive off to a table, knock it ſeveral times againſt the table, ſeveral more bees will tumble out, and perhaps the queen among them. She often is one of the laſt that falls. If ſhe is not there, ſearch for her among the main body in the empty hive, ſpreading them for this purpoſe on a table.

You muſt proceed in the ſame manner with the other hive, with the bees of which theſe are to be united. One of the queens being ſecured, you muſt put the bees of both hives together, mingle them thoroughly, and drop them among the combs of the hive which they are intended to inhabit. When they are all in, cover it with a packing or coarſe cloth, which will admit air, and let them remain ſhut up all that night, and the next day. You will ſoon be ſenſible that they are awaked from this ſleep.

The ſecond night after their union, in the duſk of the evening, gently remove the cloth from off the mouth of the hive, (take care of yourſelf) and the bees will immediately ſally forth with a great noiſe; but being too late, they will ſoon return; then inſerting two pieces of tobacco-pipes to let in air, keep them confined for three or four days, after which the door may be left open.

Providence has ordained that inſects which feed on leaves, flowers, and green ſucculent plants are in an inſenſible or torpid ſtate from the time that the winter's cold has deprived them of the means of ſubſiſtence. Thus the bees, during winter, are in ſo lethargic a ſtate, that little food ſupports them: but as the weather is very changeable, and every warm or ſunny day revives them, and prompts them to return to exerciſe, food becomes neceſſary on theſe occaſions. Mr. White very judiciouſly obſerves, that a greater degree of cold than is commonly imagined to be proper for bees, is favourable to them in winter. If a ſharp froſt, ſays that experienced gentleman, continues for two or three months, without intermiſſion, you may obſerve through your glaſs, that the bees are all this time cloſely linked together in cluſters between the combs. If they are not altogether without motion, yet it is certain they ſtir not from their places, while the cold continues, and therefore eat not at all.

A colony of bees therefore placed on the north-ſide of a building will waſte much leſs of their proviſions, than others which ſtand in the ſun; for coming ſeldom forth, they eat little; and yet in the ſpring are as forward to work and ſwarm, as thoſe which had twice as much honey in the preceding autumn. The owner ſhould however examine their ſtate in the winter, and if he finds

that inſtead of being cluſtered between the combs, they fall down in numbers on the ſtool or bottom of the hive, the hive ſhould be immediately carried to a warmer place, where they ſoon recover.

Mild winters are very injurious to bees in England, a ſmall degree of warmth enlivens them, and then they eat and conſume great part, and ſome winters all their ſtock of honey, which is neceſſary to them in a cold wet ſpring. The ſun-ſhine in winter entices them to go abroad, where by a ſudden ſhower of rain, or alteration in the degree of cold, they are diſabled, and if obliged to reſt, are ſoon killed. By theſe accidents, many ſwarms that were ſtrong, and had large proviſion of honey in autumn, are ſo weakened, and their ſtock of proviſion ſo much leſſened, that they never recover ſo as to gather any valuable quantity of honey.

But when the weather is cold, and continues ſo through great part of the winter, they are not ſo liable to theſe accidents as in milder winters; for during the continuance of froſty weather they remain inactive, torpid, and almoſt motionleſs; and eat very little or no honey.

This appears to be the reaſon that bees thrive ſo much in ſome countries more than in others, that in other reſpects ſeem to be equally proper for them; and is probably one principal reaſon of bees thriving remarkably well in Poland, where the weather is not ſo changeable as in England, and the cold of their winters continue longer, and more uniformly.

Hence a method has been thought of to preſerve bees in England, and prevent the waſte of honey in winter, different from any of thoſe hitherto mentioned.

At the uſual time of the approach of winter, the hives are removed into a dark vault or cellar; where the bees being kept cold and dark, ſoon fall into a torpid ſtate, and ſo continue throughout the winter, and till the flowers they feed upon begin to be diſcloſed. They are then removed to their ſummer ſituation, and enter upon their labours with great vigour and activity; and having a good ſtock left of the laſt year's proviſion, are in no danger of ſtarving, or ſuffering much by a backward or unfavourable ſpring, by which other bees are often greatly injured.

The bees thus removed, are not in much danger from an exceſs of cold, as that may be moderated in the ſame manner as is done for preſerving wine lodged in vaults or cellars in ſevere winters. The greateſt difficulty ſeems to be to prevent the bees being too warm in mild winters, which might make them very uneaſy and reſtleſs, as they are known to be when too much expoſed to heat in ſummer. Some have propoſed as a remedy for this, to place the hives in ice houſes; but this could be of ſervice in a very few places only, and can never be of general uſe, if ſuch a degree of cold was neceſſary, which probably it is not, as the trials that have been hitherto made of this method of diſpoſing of bees in winter have ſucceeded; all their lives, and all their honey alſo, or much the greater part of it have been ſaved.

Should this method be found effectual upon full experience, it ſeems likely to be of more general uſe, than any other hitherto propoſed; as it will without doubt be a means of greatly encreaſing the quantity of wax and honey, where it ſhall be judiciouſly practiſed.

Moſt writers on bees have obſerved, that theſe inſects are ſubject to a kind of purging in the ſpring, which is often fatal to the whole hive. Madam Vicat aſcribes this diſtemper to the honey being candied in the hive by the cold. But Columella deſcribes it as an annual diſtemper which ſeizes them in the ſpring, when the ſpurge bloſſoms, and the elm diſcloſes its ſeeds; for that the bees, being allured by the firſt flowers, feed ſo greedily upon them, that they ſurfeit themſelves therewith, and die of a looſeneſs, if they are not ſpeedily relieved. He relates Hyginus's adviſing, in this caſe, to cover the bees with aſhes of the fig-tree; and affirms, that, being enlivened by the warmth of theſe aſhes, the bees will revive in two hours, and go into a hive brought to them. Columella adviſes giving them roſemary and honey diluted with water. Ariſtomachus ſeems to have preſcribed the moſt effectual cure, namely, to take away all the viciated combs, that is, all the combs in which there are open cells appearing to contain candied honey.

The authors of the *Maiſon Ruſtique*, impute this purging to the bees feeding on pure honey, which does not form a food ſufficiently ſubſtantial for them, unleſs they have bee-bread to eat at the ſame time; and adviſe giving them a honey-comb taken from another hive, the cells of which are filled with crude wax or bee-bread.

The common practice is to feed them in the autumn, giving them as much honey as will bring the whole weight of the hive to near twenty pounds. To this end, the honey is diluted with water, and then put into an empty comb, ſplit reeds, or, as Columella directs, upon clean wool, which the bees will ſuck perfectly dry.

The following directions given for this purpoſe in the *Maiſon Ruſtique*, ſeem to be very judicious. Repleniſh the weak hives in September, with ſuch a portion of combs full of honey, taken from other hives, as ſhall be judged to be a ſufficient ſupply for them. In order to do this, turn up the weak hive, after taking the precaution of defending yourſelf with the ſmoke of rags, cut out the empty combs, and put the full ones in their place, where ſecure them with pieces of wood run acroſs, in ſuch manner that they may not fall down when the hive is returned to its place. The bees will ſoon fix them more effectually. If this method be thought too troubleſome, ſet under the hive a plate of liquid honey, unmixed with water, with ſtraws laid acroſs it, and over theſe a paper pierced full of holes, through which the bees will ſuck the honey, without daubing themſelves. This ſhould be done in cloudy or rainy weather, when the bees ſtir leaſt abroad; and the hive ſhould be covered, to protect the bees from robbers, who might be allured to it by the ſmell of honey.

Another circumſtance which may render it very neceſſary to feed the boes, is, when ſeveral days of bad weather enſue immediately after they have ſwarmed; for then, being deſtitute of every ſupply beyond what they carried with them, they may be in great danger of being ſtarved. In this caſe honey ſhould be given them in proportion to the duration of the bad weather.

But it is not enough to know how to manage bees in all ſeaſons; it will be alſo requiſite to know how to defend them from their enemies; among which hornets and waſps, and eſpecially the ſpecies of waſps which are ſcarcely larger than bees, are very formidable; for they ſeize a bee loaded with honey. If this robbery is committed near the mouth of the hive, they carry off

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the bee to a place of greater ſafety. Their neſts ſhould therefore be carefully deſtroyed, by pouring plenty of boiling-water into them; for this is by much the ſafeſt method.

The field-mouſe is an enemy to be carefully guarded againſt as ſoon as the cold begins to approach: for if it enters at that ſeaſon, it makes dreadful havock. At firſt it deſtroys the loweſt parts of the combs; but as the weather grows colder, and the bees more torpid, it aſcends up the hive, and ſeizes on the richeſt treaſure: nor does the evil end here: for other bees, ſmelling the honey ſpilt by the mouſe, fall upon the hive, and rob it of what remained; or as ſoon as the warm weather returns, and the bees ſtir about, they are ſometimes ſo diſguſted at the havock made by the mouſe, that they deſert the hive. The only way to guard againſt this, is to prevent its entering into a hive. Whilſt the bees continue in their vigorous ſtate, it dares not attack them: therefore, as ſoon as the cold approaches, the entrance to the hives ſhould be leſſened.

Bees may themſelves be reckoned enemies to bees: for they ſometimes wage cruel wars againſt each other. Their fighting and plundering one another ought chiefly to be imputed, as Mr. Thorley obſerves, either to their perfect abhorrence of ſloth and idleneſs, or to their inſatiable thirſt for honey: for when, in ſpring or autumn, the weather is fair, but no honey can be collected from plants, and is to be found only in the hives of other bees, they will venture their lives to get it there.

Dr. Warder aſſigns another cauſe of their fighting, which is, the neceſſity that the bees are reduced to when their own hive has been plundered, at a ſeaſon when it is too late for them to repair the loſs by any induſtry in the fields.

Sometimes one of the queens is killed in battle. In this caſe, the bees of both hives unite as ſoon as her death is generally known among them. All then become one people: the vanquiſhed go off with the robbers, richly laden with their own ſpoils, and return every day, with their new aſſociates, to pillage their own habitation. This cauſes a throng unuſual for the ſeaſon, at the door of the hive they are plundering; and if the owner lifts it up at night, when all are gone home, he will find it empty of inhabitants; though there perhaps will remain in it ſome honey, which he takes as his property.

When two ſwarms take flight at the ſame time, they ſometimes quarrel, and great numbers are deſtroyed on both ſides, till one of the queens is ſlain. This ends the conteſt, and the bees of both ſides unite under the ſurviving ſovereign.

Robbers make their attacks chiefly in the latter end of July, and the month of Auguſt. They appear to act with caution at firſt, and to procure themſelves an entrance by ſtealth; not pitching boldly like the native bees, and then entering at once in at the door. If they are encouraged by ſucceſs, they return in greater parties, ſometimes all the bees of a hive, and endeavour to force that entrance which they ſought before with ſo much caution. They come in ſuch numbers, as frequently to make thoſe who are not acquainted with theſe ſcenes, miſtake them for new ſwarms: but the number of dead bees ſtrewed on the ground, ſoon convince them of this error. Columella adviſes to kill the queen, if poſſible; but the moſt effectual way to prevent the loſs of bees, as well as of honey, occaſioned by theſe robberies, is, early in the autumn, to leſſen the entrance into the hive, as before directed, ſo as to leave room for only two or three bees to paſs a-breaſt.

In the third claſs of enemies to bees is a ſmall caterpillar, termed the wax-worm, or wax-moth, becauſe of the havock it makes on wax. It is tender in its frame, unarmed and defenceleſs; and yet can ſubſiſt itſelf in the midſt, and at the coſt, of the moſt numerous hive. A few of theſe little caterpillars will deſtroy and break to pieces the combs of a hive, build up new edifices for lodging themſelves in it, and finally force the bees to quit the place.

This inſect is of the ſpecies of the falſe-moth, and is extremely nimble. It is enough for it to get into a hive unawares. It runs ſo very ſwiftly, that it paſſes unperceived, and ſlides into ſome narrow place between the combs, perhaps inacceſſible to bees, there to lay its eggs in ſecurity. This done, it makes its eſcape as well as it can. From each of theſe eggs proceeds a caterpillar, which eſcapes certain death merely by its extreme ſmallneſs, and the quickneſs with which it ſpins and enwraps itſelf in a covering ſufficient to ſecure it from all harm. This covering, or tube, is glued to the wax which the caterpillar feeds on, and this inſect lengthens the tube as it eats the wax, till at laſt it ſhuts itſelf up, in order to be transformed into a chryſalis. Several caterpillars, and conſequently ſeveral moths, muſt proceed from the eggs which the males and females engender. Probably the bees deſtroy great numbers of the moths: however, if a ſingle female has an opportunity to lay her eggs, ſhe is ſo exceedingly prolific, that this ſecond brood may quite overſpread the hive. If one of the impregnated females eſcapes out of the hive by means of her great nimbleneſs, ſhe ſeeks out another hive, in which ſhe ſpreads the ſame ſource of miſchief.

The only method of deſtroying theſe pernicious inſects is to take away the infected hive; and after clearing it from the moths, reſtore it to the proper owners, who will now work with greater diligence and reſolution.

The next particular neceſſary to be known, is how to ſeparate the honey from the wax. In order to this, the combs ſhould be laid in a place perfectly ſecure from the acceſs of bees; for otherwiſe the bees would not only carry off much honey, but alſo be extremely troubleſome by ſtinging the people at work. It is proper to burn cow-dung, or rotten hay, at the doors and windows of this place; becauſe the ſmell of the ſmoke ariſing from thence is ſo diſagreeable to the bees, that it will drive them away. If any bees remain in the comb, they ſhould be bruſhed off with the wing of a fowl into a tub of water, and being afterwards dried in another place, they will fly back to their hive. If the combs are taken out of the hive before the end of autumn, there are generally young bees in them. The parts of the combs in which theſe are ſhould be laid aſide, for they would give a bad taſte to the honey. The bee-bread muſt alſo be ſeparated, and both ſhould be melted with the wax.

Before the combs are laid to drain out their honey, they ſhould be carefully cleaned of every ſort of filth, or inſects. The cruſt with which the bees cover the honey in them ſhould then be pared off with a ſharp, thin, broad knife, and the combs themſelves ſhould be divided through the middle, in ſuch manner as to render the cells

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open at both ends, that the honey may flow the more freely out of them. The combs ſhould be laid in this ſtate on ſieves, or ſome other contrivance which will afford the honey a free paſſage. It will run quite clear; and the honey thus obtained ſhould be kept by itſelf, as being the pureſt and beſt.

The combs, which are but partly filled, and alſo thoſe that were full and have done running, are broken by hand, and the honey in them is ſqueezed out. Some put the broken combs into a ſtrong bag, and then uſe a preſs to ſqueeze the honey out of them; and even warm the broken combs with the help of fire: but neither of theſe laſt conſider that, in both theſe ways, much of the wax paſſes through the bag with the honey, and thus the wax being of greater value than the honey, the owner ſuſtains a loſs in that reſpect, beſides that his honey becomes the leſs valuable, in proportion to its being leſs pure. It is true, that great part of the wax thus mixed with the honey ſoon riſes to the ſurface, and may be taken off, eſpecially after the honey is grown hard.

The makers of mead need not be extremely ſolicitous about ſeparating the honey ſo very perfectly from the wax, becauſe, by waſhing the wax in cold water, the honey will diſſolve in the water, and the wax being ſtrained from it by running the water through a coarſe cloth, neither bad taſte nor impurity will be communicated by it to the water, which may afterwards be uſed for making mead. The wax that has been ſkimmed off the honey ſeparated by preſſure, ſhould be waſhed in the ſame manner; becauſe, by this means, no part of the wax will be loſt.

The goodneſs and flavour of honey depend on the fragrance of the plants from which the bees collect it: and hence it is that the honey of different places is held in different degrees of eſtimation. That which is made early in the year is alſo preferred to what is collected in the latter end of the ſeaſon.

In order to obtain the wax in a pure ſtate, what remains of the combs after ſeparating the honey, together with the combs which contain bee-bread and young bees or maggots, is put into a copper with a ſufficient quantity of clean water, which is made to boil over a ſlow fire, and ſtirred frequently with a ſtick. When the wax is melted, it is run through bags, which are put into a preſs, to ſeparate the wax perfectly. The wax runs from the preſs into a veſſel placed underneath, with ſome water in it, to prevent the wax from ſticking to it. What remains after the preſſure may be again boiled in water, in order to obtain more wax from it: and this ſhould be repeated by ſlow boilings, rather than by boiling it ſtrongly at once.

When all the wax is thus ſeparated from the dregs, it is again melted in water, over a very gentle fire, and ſkimmed clean whilſt any ſcum ariſes. It is then poured into veſſels ſuited to give it the deſired form, after previouſly putting into them a little water, to keep the wax from ſticking to them. Theſe veſſels are then carried into a place where the wax may cool gradually. It is found that, the larger the cakes of wax are, the better the wax keeps, and the higher price it brings; alſo, that the more gentle it has been boiled, the better it likewiſe is: for too haſty boiling renders it hard, and this increaſes the difficulty of bleaching it. Whatever filth ſticks to the bottom of the cake is ſcraped off with a knife.

We ſhall conclude this article with a few directions for purchaſing bees; which ſhould always be done in the ſpring, as the dangers of the winter are then over. The ſummer is an improper time for buying them, becauſe the heat of the weather then ſoftens the wax, and thereby renders the combs liable to break, if they are not very well ſecured. The honey too, being then thinner than at other times, is more apt to run out of the cells, which is attended with a double diſadvantage, namely, the loſs of the honey, and the daubing of the bees, whereby many of them may be deſtroyed. A firſt and ſtrong ſwarm, may indeed be carried away in the night after it has been hived.

The hive ſhould be full of combs, and well ſtored with bees. The purchaſer ſhould examine the wax, in order to know the age of the hive. The combs of a year old are white; thoſe of two years are dark coloured, or yellow; and where the combs are black, the hive ſhould be rejected; becauſe old hives are moſt apt to be infected with the moth, and moſt liable to other accidents. For this reaſon, the ſtate of the combs ſhould be examined as high up as poſſible; becauſe the lower parts of the combs may have been cut off, and renewed in the preceding ſummer. It ſometimes, though rarely, happens, that two queens continue to govern ſeparately in the ſame hive; and in this caſe a large comb forms the barrier. Such hives ſhould be rejected, becauſe there is not in them that harmony which is neceſſary for the ſucceſs of the bees.

In order to judge of the ſtate of the hive, it may be raiſed a little in the evening, ſo as to admit a more than uſual degree of cold; for this will drive the bees to the top of the hive, and ſo benumb them, that the next morning there will be no danger of their ſtinging. If any ſuch danger does appear, a pot of lighted charcoal, with ſome linen-rags upon it, may be got ready, and held under the hive whilſt it is pulled back in order to be examined.

We may alſo judge of the thriving ſtate of the hive by the following appearances. Bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and not come out of the hive in bad weather; for when they do, this indicates that they are in great want of proviſions. They are alert on the leaſt diſturbance; they preſerve their hive free from all filth, or dead nymphs or bees; they are ready to aſſiſt the bees which return loaded from the fields, and to defend the hive againſt every enemy that dares to approach: they make a continual humming noiſe, which increaſes on the leaſt touch. Indeed, by the loudneſs of the humming, we may judge of the ſtrength and progreſs of the hive, and therefore this ſhould be frequently noticed, to enable us to form the better judgment of the preſent ſtate the bees are in. *Columella, lib.* IX. *Maiſon Ruſtique, tom.* I. *Memoires, &c. de la Societé de Berne: Anné* 1764. *Réaumur's Memoires pour ſervoir à l'Hiſtoire Nautrelle des Inſectes, tom.* V. *Thorley's Enquiry into the Nature, &c. of Bees. Warder's Monarchy of Bees. White's collateral Bee-boxes. Mill's Eſſay on the Management of Bees.*

BEECH, the name of a well known tree, and of which ſome planters ſuppoſe there are two diſtinct ſpecies: calling the one the mountain or wild beech, and the other the common beech. They alſo ſay, that the wood of the former is whiter than that of the latter; but Mr. Miller aſſures us that there is only one ſpecies of this tree,

and that the difference in the colour of the wood ariſes from the difference in the ſoils.

This tree is propagated by ſowing the maſt, which may be done at any time from October to February, only obſerving to ſecure the ſeeds from vermin when early ſown; and, if this be carefully done, the ſooner they are ſown after they are fully ripe, the better: a ſmall ſpot of ground will be ſufficient for raiſing a great number of theſe trees from ſeed; for if the plants are come up very thick, the ſtrongeſt of them ſhould be drawn out the autumn following, that thoſe left may have room to grow; ſo that a ſeed-bed, carefully managed, will afford a three year's draught of young plants, which ſhould be planted in a nurſery, and, if deſigned for timber trees, at three feet diſtant row from row, and eighteen inches aſunder in the rows.

But if they are deſigned for hedges, to which the tree is very well adapted, the diſtance need not be ſo great; two feet row from row, and one foot in the rows, will be ſufficient. In this nurſery they may remain two or three years, obſerving to dig up the ground between the roots, at leaſt once a year, that their tender roots may the better extend themſelves every way: but be careful not to cut or bruiſe their roots, which is injurious to all young trees; nor ſhould you ever dig the ground, in ſummer, when the earth is hot and dry; for by letting in the rays of the ſun to the roots, the young trees are often deſtroyed.

This tree will grow to a conſiderable ſtature, though the ſoil be ſtoney and barren, as alſo upon the declivities of hills and chalky mountains, where they will reſiſt the wind better than moſt other trees; but then the nurſeries for the young trees ought to be made upon the ſame ſoil; for if they are raiſed on good ground, and in a warm expoſure, and afterwards tranſplanted into a bleak barren ſituation, they ſeldom thrive. The nurſery ſhould therefore be made upon the ſame ſoil, where the plantation is intended, and the plants drawn annually to extend the plantation.

The tree is very proper to form large hedges to ſurround plantations, or wilderneſs quarters; and may be kept in a regular figure, if ſheared twice a year; eſpecially if they ſhoot ſtrong; in which caſe, if they are neglected but a ſeaſon or two, it will be very difficult to reduce them again.

The ſhade of this tree is very injurious to moſt ſorts of plants which grow near it, but is generally believed to be very ſalubrious to human bodies.

It delights in a chalky or ſtony ground, where it generally grows very faſt; the bark of the trees in ſuch land is clear and ſmooth, and although the timber is not ſo valuable as that of many other trees, yet as it will thrive on ſuch ſoils, and in ſuch ſituations where few better trees will grow, the planting of them ſhould be encouraged, eſpecially as the trees afford an agreeable ſhade, and the leaves make a fine appearance in ſummer, and continue green as long in autumn as any of the deciduous trees; therefore in parks, and other plantations for pleaſure, this tree deſerves to be cultivated among thoſe of the firſt claſs, eſpecially where the ſoil is adapted to it. *Miller's Gard. Dict.*

The timber is of great uſe to turners for making trenchers, diſhes, trays, &c. and alſo to carpenters for making ſtools, bedſteads, &c. Shipwrights likewiſe often uſe it for the keels of ſhips; and it is eſteemed the beſt wood for firing. The thin lamina, or ſcale of the wood, commonly called paſte-board, is uſed in making band-boxes, hat-caſes, &c.

Beech-wood is well known to be ſubject to worms, which ſoon deſtroy it. This worm is ſuppoſed to feed upon the ſap remaining in the wood after it is cut into ſcantlings, and worked up for uſe. If therefore the ſap can, by any means, be extracted, the wood will be much leſs ſubject to decay. Upon this principle, a correſpondent of the authors of the *Muſeum Ruſticum* greatly improved the wood, by laying it a reaſonable time in a pond, and afterwards drying it in the ſhade; by which means the timber when applied to uſe, was at leaſt as good, and as durable as elm. He adds, that by boiling the wood intended for ſmaller works, ſuch as bowls, trenchers, chairs, &c. two or three hours in a copper filled with water, all the ſap will be extracted, the wood will work pleaſanter, be more beautiful when finiſhed, and laſt, without compariſon, longer. *Muſeum Ruſticum vol.* II. *pag.* 135.

BEECH *maſt*, the ſeed of the beech-tree.

This maſt is very good for feeding ſwine; ſo that in ſome counties of England, where there are large woods of beech-trees, the hogs are fed for months together on the maſt only. They thrive prodigiouſly on this food only, ſo that many porkers are killed in a year fatted with beech-maſt, without the aſſiſtance of any other food. It is, however, the better way to take them up, and give them either pollard, barley-meal, or peaſe, for a month or five weeks, when they will be fit for the tub.

But beech-maſt, like acorns, are apt to give the hogs a diſtemper called the garget; which may be effectually prevented, if a few peaſe or beans, moiſtened with water, and ſprinkled over with antimony finely powdered, be given them every other day for a fortnight or three weeks. *Muſeum Ruſticum, vol.* I. *p.* 474.

BEES-NEST, or *birds-neſt*, the ſame with wild carrot. *See the article Wild* CARROT.

BEER, a common and well known liquor, made of malt and hops, and uſed in various parts of Europe, particularly in thoſe where the vine will not flouriſh, and where cyder is ſcarce. *See the article* BREWING.

The grounds, or ſettlings of beer, &c. form a very rich manure.

BEESTINGS, the firſt milk taken from a cow after calving.

If this milk be not taken away clean from the cow upon her firſt calving, it will often make the cow's milk to dry away. Nor ſhould the beeſtings be given to the calf, as it is very apt to ſurfeit. *Liſle's Huſbandry, vol.* II. *p.* 143.

BEETLE, a wooden inſtrument in the form of a mallet, but much larger, uſed in driving piles, wedges, hedge-ſtakes, &c.

BEETLE, is alſo the name of a flying inſect, of which there are a great variety of ſpecies; but they have all of them caſes over their wings to defend them from hard bodies, which they often meet with when they dig holes in the ground, or gnaw rotten wood with their teeth, to make themſelves houſes or neſts. When they fly they fill the air with a humming noiſe, and, perhaps, greater than that of any other inſect. There are different ſorts of beetles, ſome being large with horns, and others ſmall, and without horns.

B E R

BEEVES, a general name for oxen, or black cattle in general.

BEHEN, a ſpecies of chickweed, frequently called ſpattling-poppy. *See* CHICKWEED.

BENT-*graſs*, a ſpecies of graſs common in paſture grounds; there are ſeveral ſorts of this graſs, particularly that called fine bent, for the gathering the ſeeds of which the Society offered a premium. We have given a figure of one of the ſpecies of bent-graſs, on Plate III. Fig. 11.

BERE, or *bear*, a ſpecies of barley. *See the article* BARLEY.

BERNE-MACHINE, the name of an engine for rooting up trees, invented by Peter Sommer, a native of Berne in Switzerland.

A model of this machine was ſent by the Berne Society to the Society for the Encouragement of Arts in London, and from this model the drawing on Plate IV. Fig. 1. was made. The engine conſiſts of three principal parts, the beam, the ram, and the lever. The beam A B C, of which only one ſide is ſeen in the figure, is compoſed of two ſtout planks of oak of three inches thick at leaſt, and ſeparated by two tranſverſe pieces of the ſame wood at A and C, about three inches thick. Theſe planks are bored through with correſponding holes, as repreſented in the figure, to receive iron pins, upon which the lever acts between the two ſides of the beam, and which are ſhifted higher and higher, as the tree is raiſed, or rather puſhed out of its place. The ſides are well ſecured at top and bottom, by ſtrong iron hoops.

The iron pins on which the lever reſts, ſhould be an inch and a quarter, and the holes through which they paſs, an inch and a half in diameter. The poſition of theſe holes is ſufficiently indicated by the figure,

The foot of the beam, when the machine is in action, is ſecured by ſtakes repreſented at G, driven into the earth.

The ram D, which is made of oak, elm, or ſome other ſtrong wood, is capped with three ſtrong iron ſpikes, repreſented at *f*, which takes faſt hold of the tree. This ram is ſix or eight inches ſquare, and a ſlit is cut lengthwiſe through the middle of it, from its lower end at L, to the firſt ferule *a*, in order to allow room for the chain *g h*, to play round the pulley K, which ſhould be four inches thick, and nine inches in diameter. This ram is raiſed by means of the chain *g h*, which ſhould be about ten feet long, with links four inches and three quarters in length, and an inch thick. One end of this chain is faſtened to the top of the beam at C, while the other, after paſſing through the lower part of the ram, and over the pulley K, terminates in a ring or link repreſented Fig. 3. the two ears *m*, *n*, of which ſerve to keep it in a true poſition between the two planks of the beam. In this ring the hook P is inſerted.

The hook is repreſented in profile, Fig. 2. where F is the part that takes hold of the ring. But it muſt be obſerved, that the parts of this machine, repreſented in Fig. 2, 3. are drawn on a ſcale twice as large as the whole engine, Fig. 1.

The hook F, Fig. 2. ſhould be made of very tough iron, as well as the handle D, and the arch E *c*. This handle ſhould be two inches thick at *z*, where it joins to the hook, and the thickneſs gradually leſſen by degrees up to the arch, which need not be more than half an inch thick.

On each ſide of the pin *z*, is a ſemi-circular notch, *x*, *y*, which reſts alternately on the pins, when the machine is worked. The hole D, and the arch *E c*, ſerve to fix a long lever of wood E F, Fig. 2. by means of two iron pins; and by this contrivance the lever is either raiſed or depreſſed at pleaſure, in order to render the working of the machine eaſy in whatever part of the beam the lever may be placed: for without this contrivance the extremity of the lever E F, would, when the handle *d* F was near the top of the beam C, be much higher than men ſtanding upon the ground could reach. It muſt, however, be remembered that the lever is often ſhortened by this contrivance, and conſequently its power leſſened.

The machine is worked in the following method: it is placed againſt a tree, in the manner repreſented in the figure, ſo that the iron ſpikes at *f* may have hold of the tree, and the end of the beam A be ſupported by ſtakes repreſented at G. The iron handle, Fig. 2. is placed in the opening between the two planks of the beam, and the wooden lever fixed to it by means of the iron pins already mentioned. The hook F takes hold of the chain, and one of the iron pins is thruſt into the outer row of holes, by which means the outer notch *x* will reſt on the pin, which will be now the center of motion; and the end of the lever E, Fig. 1. being preſſed downwards, the other notch *y*, Fig. 2. will be raiſed, and at the ſame time the chain, and conſequently the ram. The other iron pin is now to be thruſt into the hole in the inner row, next above that which was before the center of motion, and the end of the lever E, Fig. 1. elevated, or puſhed upwards, the latter pin on which the notch *y* reſts, now becoming the center of motion. By this alternate motion of the lever, and ſhifting the pins, the chain is drawn upwards, over the pulley K, and conſequently the whole force of the engine exerted againſt the tree. There is a ſmall wheel at L, in order to leſſen the friction of that part of the machine.

From this account the reader will very eaſily perceive that the machine is nothing more than a ſingle pulley, compounded with a lever of the firſt and ſecond order; and therefore its power may be eaſily computed from the nature of the pulley and lever.

It muſt, however, be remembered, that as the puſh of the engine is given in an oblique direction, it will exert a greater or leſſer force againſt the horizontal roots of the tree in proportion to the angle formed by the machine with the plane of the horizon; and that the angle of 45° is the maximum, or that when the machine will exert its greateſt force againſt the horizontal roots of the tree.

M. N. E. Tſcharner, ſecretary to the Berne Society, obſerves, in a letter ſent to the Society for the Encouragement of Arts, &c. in London, and dated Berne, Jan. 10th, 1763, that by repeated experiments with this machine, he has found that the chain *g h*, is ſo far from giving an additional power, that it hinders the play and effect of the engine by its friction; and that when the ram preſſes ſtrongly againſt the beams, the chain is ſqueezed between the beams ſo as to render the upper holes uſeleſs, and prevents the machine from being worked out to its full length; in conſequence of which it is obliged to be removed from its firſt place, and fixed

again anew; which neceſſarily occaſions a loſs of time. He alſo found that the ram was too ſhort. He has therefore taken away the chain, and lengthened the ram four feet.

The inconvenience of the chain was immediately ſeen by the Society for the Encouragement of Arts, and therefore the machine at large made by their directions, was conſtructed without it. The ram moved between the two cheeks of the beam, and was puſhed up by the alternate motion of the lever. And that the force of the machine might not be leſſened by the removal of the chain, the lever was made of twice the length of that in the Berne model.

It will be very readily granted, that an engine conſtructed in this manner will be very uſeful in ſaving the labour of men; though very inadequate to the taſk intended, that of throwing down trees. For it ſufficiently appeared from experiments made by the committee of mechanics, that trees above ſixteen inches diameter, eſpecially of oaks or elms, cannot be thrown down with this engine, without the aſſiſtance of cutting their roots.

BEVERAGE, drink, liquor to be drank.

BIENNIAL *plants*, ſuch as continue two years.

BIG, the ſame with bear, or ſquare barley. *See the article* BARLEY.

BIGGE, a pap, or teat.

BILL, an edged tool uſed by huſbandmen in cutting buſhes, &c. It is a kind of hatchet with a hooked point, and a handle either ſhorter or longer, according to the various uſes for which it is intended.

BIN, or BINN, a place where corn, &c. is depoſited.

BIND-WEED, called by ſome *with-wind*, a troubleſome weed, of which there are two ſpecies, the ſmaller and the greater.

The firſt, or ſmaller bind-weed, commonly called gravel bind-weed, is very common upon dry banks, and in gravelly ground in moſt parts of England, and is generally a ſign of gravel lying near the ſurface. Its roots penetrate very deep into the ground, whence it is in ſome countries called devil's guts. It is a very troubleſome weed both in gardens and fields.

The ſecond or greater bind-wind, is alſo a troubleſome weed; but in an open clear ſpot of ground, where the plants are conſtantly hoed down for three or four months, they may be effectually deſtroyed; for when the ſtalks are broken or cut, a milky juice flows out, by which the roots are ſoon exhauſted, and decay; but as every part of the root will grow, this circumſtance renders it a troubleſome weed to deſtroy, where its roots are intermixed with thoſe of other plants. *Miller's Gard. Dict.*

Mr. Liſle, after obſerving that he believes bind-weed propagates itſelf in paſture grounds chiefly by its ſeeds, and by its roots in arable land, becauſe it ſeems to flower too late in corn to ſeed before the corn is cut, thinks the reaſon why it is moſt apt to multiply in clayey ſoils, is becauſe ſuch ground being, in the common practice, ploughed only in winter months, after wheat, for other crops as barley, peaſe, or oats, and not till about September for winter vetches; this tillage cannot deſtroy the roots or ſeeds of weeds like the ſummer fallows for wheat; but, on the contrary, promotes their increaſe, particularly from the off-ſets, or joints of the roots. "I have known, ſays he, in this caſe, clay-land folded for barley, and particularly that part of it which, waiting for the folds going over it laſt, was lateſt fallowed, bring up ſuch an increaſe of with-wind, that, though the ſpring and ſummer had been very dry, every ſtem of barley had a with-wind round it. As the fold brought up a crop of this corn, it brought up with each plant its enemy, which would eat it out, pull it down before it could ripen, and thereby prevent the filling of the grain. The crop is alſo greatly hazarded here, after it is cut, from the danger it muſt run by laying in ſwarth, till this weed is withered before it can be carted. Again, near the end of the firſt ſummer, after the firſt year of a crop of hop-clover, which I fed, that is about the beginning of Auguſt, I fallowed the ground for wheat, then dunged the fallows, and ſowed the wheat before Michaelmas. I had a very good crop of wheat; but a with-wind came up to every plant; ſo that had it been a wet and cold ſummer, inſtead of a hot and dry one, as it chanced to be, my corn would have been pulled down and lodged while green in the ear, and in the milk, and could not then have filled in body and flour, but muſt have been of the nature of blighted corn. The increaſe of the with-wind here was, without doubt, occaſioned by laying down this ground only to one ſummer ſeed after the hop-clover was ſown, when it had borne three or four crops of ſummer corn after its wheat crop; for by the winter ploughing, as I intimated before, the off-ſets of the roots of weeds, and their ſeeds, were propagated. I could not conveniently deſtroy theſe roots or ſeeds by giving the ground a ſeaſonable ſummer fallow in the beginning of June; becauſe I ſhould then have loſt the fruits of my hop-clover crop, by ploughing it in at the beginning of the firſt ſummer: though this would have contributed much to the killing of the with-wind: whereas, by delaying the fallowing three months longer, viz. to the beginning of Auguſt, when the ſun had loſt its ſtrength to burn up the roots and malt the ſeeds, and it was too late for the ground to lie long to a fallow, the dung laid on the fallows, gave new life to the roots. and ſeeds." *Liſle's Huſbadry, vol.* II. *p.* 303.

BIRCH, the name of a tree ſo well known as to need no deſcription. This tree is not much eſteemed for its wood, but however it may be cultivated to advantage upon barren land, where better trees will not thrive; for there is no ground ſo bad, but this tree will thrive in it; for it will grow in moiſt ſpringy land, or in dry gravel or ſand, where there is little ſurface: ſo that upon ground which produced nothing but moſs, theſe trees have ſucceeded ſo well, as to be fit to cut in ten years after planting, when they have been ſold for near ten pounds per acre ſtanding, and the after-produce have been conſiderably increaſed. And as many of the woods near London, which were chiefly ſtocked with theſe trees, have been of late years been grubbed, ſo the value of theſe plantatious have advanced in proportion. Therefore thoſe perſons who are poſſeſſed of ſuch poor land, cannot employ it better, than by planting it with theſe trees, eſpecially as the expence of doing it is not great.

The beſt method to cultivate this tree, is to furniſh yourſelf with young plants from the woods, where they naturally grow, and are generally found there in great plenty; but in places where there are no young plants to be procured near, they may be raiſed from ſeeds,

which ſhould be carefully gathered in the autumn, as ſoon as the ſcales under which they are lodged begin to open, otherwiſe they will ſoon fall out and be loſt: the ſeeds are ſmall, ſo ſhould be not buried deep in the ground. The autumn is the beſt ſeaſon to ſow them; and in a ſhady ſituation, the plants will thrive better than when they are expoſed to the full ſun; for in all places where there are any large trees, their ſeeds fall, and the plants come up well without care; ſo that if the young plants are not deſtroyed by cattle, there is generally plenty of them, in all the woods where there are any of theſe trees. Theſe wild plants ſhould be carefully taken up, not to injure the roots. The ground where they are to be planted, will require no preparation; all that is neceſſary to be done, is to looſen the ground with a ſpade or mattock, in the places where the plants are to ſtand, making holes to receive their roots, covering them again when the plants are placed, cloſing the earth hard to their roots. If the plants are young, and have not much top, they will require no pruning; but where they have buſhy heads, they ſhould be ſhortened, to prevent their being ſhaken and diſplaced by the wind. When the plants have taken root, they will require no other care, but to cut down the great weeds which would over-hang the plants, being careful not to cut or injure the young trees. This need not to be repeated oftener than twice in a ſummer the two firſt years, after which time the plants will be ſtrong enough to keep down the weeds, or at leaſt be out of danger from them.

Theſe may be planted any time from the middle of October, till the middle of March, when the ground is not frozen; but in dry land the autumn is the beſt ſeaſon, and the ſpring for moiſt. The diſtance which they ſhould be planted, is four feet ſquare, that they may ſoon cover the ground, and by ſtanding cloſe they will draw each other up; for in ſituations where they are much expoſed, if they are not pretty cloſe, they will not thrive ſo well.

If the plants take kindly to the ground, they will be fit to cut in about ten years; and afterwards they may be cut every ſeventh or eighth year, if they are deſigned for the broom-makers only; but where they are intended for hoops, they ſhould not be cut oftener than every twelfth year.

The broom-makers are conſtant cuſtomers for birch, in all places within twenty miles of London, or where it is near water-carriage: in other parts the hoop-benders are the purchaſers; but the larger trees are often bought by the turners, and the wood is uſed for making ox-yokes, and other inſtrument of huſbandry.

In ſome of the northern parts of Europe, the wood of this tree is greatly uſed for making of carriages and wheels, being hard and of long duration. In France it is generally uſed for making wooden ſhoes. It likewiſe makes very good fuel.

In ſome places theſe trees are tapped in the ſpring, and the ſap drawn out to make birch-wine, which has been recommended for the ſtone and gravel, as is alſo the ſap unfermented. The bark of the birch-tree is almoſt incorruptible. In Sweden the houſes are covered with it, where it laſts many years. It frequently happens, that the wood is entirely rotten, and the bark perfectly ſound and good. *Miller's Gard. Dict.*

The beſt method of obtaining the ſap of the birch-tree for making wine, &c. is to bore a hole ſlanting upwards with a middle-ſized augre to a moderate depth in the tree, and to faſten a bottle to the orifice, by which means a large quantity of the ſap may be ſpeedily procured. Or many gallons in a day may be gathered from the boughs of the trees by cutting them off, leaving their ends fit to go into the mouths of bottles, and ſo by hanging many bottles on ſeveral boughs, the liquor will diſtil into them very plentifully.

The ſeaſon for this work is from the end of February to the end of March, whilſt the ſap riſes, and before the leaves ſhoot out from the tree; for when the ſap is forward, and the leaves begin to appear, the juice, by a long digeſtion in the branch, grows thick and coloured, which before was thin and limpid. Nor will the ſap diſtil either in the night, or in cold weather while the north and eaſt winds blow; but very well and freely, when the ſouth-weſt winds blow, or the ſun ſhines warm.

The liquor is beſt that proceeds from the branches having been a longer time in the tree, and thereby better digeſted, and acquiring more of its flavour than if it had been extracted from the trunk. *Mortimer's Huſbandry, vol.* II. *p.* 406.

In order to have enough of this liquor to ſet about making wine with it, many trees ſhould be tapped at the ſame time, ſo that a ſufficient quantity of ſap may be obtained in a few days; for it will not keep long, without a tendency to putrefaction. To prevent this, ſome authors adviſe ſetting that which is firſt drawn in bottles, or other proper veſſels, in the ſun, till the reſt be ready, and to put into it a hard toaſt of rye-bread cut thin, to make it ferment. But as it is neceſſary to mix with this juice either ſugar or raiſins, in order to give it a body, to enable it to undergo a regular fermentation, which alone can render it fit for keeping, and for want of which it is that this wine is ſo apt to burſt the bottles into which it is put, that firſt fermentation will certainly be found hurtful. When therefore the huſbandman has not a ſufficient number of trees to obtain ſap enough for his purpoſe in two or three days, the moſt adviſable way will be to put the ſap into very ſweet veſſels, and place them in a cool cellar; for it will keep there perfectly ſound, for a much longer time, eſpecially if it be covered with oil, or bunged up cloſe.

The proportion of ſugar may be varied according to the taſte and intention of the brewer: but, in general a pound of ſugar is thought to be the proper allowance for a gallon of this liquor. The ſap and ſugar muſt be thoroughly united by a heat juſt ſufficient to make them boil; but the long boiling, which is generally adviſed, can anſwer no good purpoſe: on the contrary, it will render the liquor leſs diſpoſed to ferment kindly, and likewiſe deprive it of a conſiderable part of the peculiar fragrance and flavour of the tree from whence it was taken. It ſhould therefore be carefully remembered, that the ſole purpoſe of boiling this liquor is, to make a thorough diſſolution of the ſugar in it. Some people ſubſtitute honey inſtead of ſugar; in this caſe a quart of honey is eſteemed equal to a pound of ſugar. With regard to various ſpices ordered by different writers, they muſt be left to the taſte and opinion of the maker.

It is generally found neceſſary in order to ferment this liquor, to put into it a little yeaſt, a bit of dough, or thin

thin toaſt of leavened bread; after which it is treated in all reſpects likeother vinous l quors. See the articles FERMENTATION and WINE.

It is ſaid, that in the North, where large birch and plane trees are frequent, their ſap is obtained in ſuch plenty as to be uſed for brewing, inſtead of water, and that it makes equally ſtrong beer with much leſs malt. Dr. Tong, in the Philoſophical Tranſactions, No 46. ſays, that one buſhel of malt brewed with this liquor will make as good ale as four buſhels with common water. He thinks the ſap of the ſycamore the beſt for brewing; becauſe it is very ſweet, and, at the ſame time, very wholeſome.

BIRD-GRASS, *or* FOWL-MEADOW-GRASS, a very excellent graſs imported from Virginia, by the late Peter Wych, Eſq; and has been cultivated with ſucceſs by Mr. Roque. The Rev. Dr. Elliott of New-England, in his Eſſays on Field-Huſbandry, tells us, that it acquired this odd name from its being brought into a piece of poor meadow at Dedham, by ducks and other wild water-fowl. We have given a figure of this valuable graſs on Plate IV. Fig. 4.

As Mr. Roque is the only perſon that has ſucceſsfully cultivated this ſpecies of graſs, we ſhall give our readers his own account of it, which he ſent in a letter to the Society for the Encouragement of Arts, &c.

"In the month of March, 1764, I received from the late Peter Wych, Eſq; the chairman of the committee of agriculture in the Society for the Encouragement of Arts, &c. an ounce and a half of the ſeed of a ſpecies of graſs called bird-graſs. He obtained it from Virginia, where it grows, though it is not a native graſs. The intention of putting it into my hands was, in order that I ſhould cultivate it, and be thence able to form a judgment whether it might have any peculiar properties not found in our graſſes, that would render it an advantageous article of culture here. He had, himſelf, conceived a very high opinion of it, by the information he had gained concerning it, from the country whence it came; and intended, as ſoon as he ſhould have due proof from experiment, of what he hoped, to bring it before the Society for the Encouragement of Arts, &c. who had, with public-ſpirited zeal, entered very minutely into the conſideration of the means of improving paſtures. Being very ſolicitous to acquit myſelf of the truſt, I carefully preſerved this little treaſure till the month of April, which I thought might be a fit time to ſow it. Not being acquainted with the particular nature of this graſs, I prepared the ground for it, in the ſame manner I ſhould have done for a flower-bed: raking it with a wooden rake. I did this as I was willing by every means to ſecure its coming up: but ſuch care would not have appeared in the leaſt neceſſary, had I known its great hardineſs, and force of vegetating power, as I have done ſince.

"At the time I expected the bird-graſs to riſe from my ſeed, I found the weeds and common graſs coming up very thick: ſo that I could not diſtinguiſh the deſired kind from theſe intruders: particularly the poa-graſs. Being a ſtranger, as I before ſaid, to the appearance of the bird graſs, I thought it the beſt way to weed out the other graſs and herbs which I knew, and to let what I could not diſtinguiſh to be ſo remain in the ground: and my eagerneſs was ſo great to perceive whether the bird-graſs was come up, that I went almoſt every hour to look after it. I diſcovered it at laſt, in about a month from the time of its being ſown, by its having a deeper green hue than is commonly ſeen in our graſſes: and I tranſplanted it as ſoon as I imagined it would bear moving, into ſome of the ſame kind of ground, as that on which it had been raiſed: having firſt turned it up and cleared it from weeds. The ſize of this piece of ground was about twenty rods: part of it a little gravelly, and the other part of it moory land. I ſoon perceived the bird-graſs grew better on the gravelly than on the moory part of the ground. That on the gravelly being of a better colour and ſweeter than that on the moory; which was pale and yellow. And with reſpect to the moory ground itſelf, one part was moiſter than the other, and the bird-graſs grew better on the drier ſide than on the wet. The graſs, however, looked well all the ſummer, and in the month of September following, I began to gather the ſeed, and proceeded in it till October. The quantity of the ſeed was above twelve pounds.

"The firſt year the graſs did not grow to above two feet and a half high: but the ſecond it roſe to be four feet high. On the 14th of June of that year, being 1765, I meaſured out ten rods of this graſs, and cut it. Three days after I weighed the product of this ten rod, herb and ſeed together: and they amounted to twelve hundred pounds. The tenth of Auguſt following, the ſame graſs was again grown to the height of two feet eight inches, and was a ſecond time fit to cut for hay: but I did not cut it; becauſe I wanted a ſecond crop of ſeed: which I obtained in the beginning of October; and it proved a much greater crop than the former. About this time a good deal of rain fell, which occaſioned me no ſmall ſhare of trouble in drying the graſs, and turning the little cocks. I then firſt remarked that ſhoots were made from almoſt every joint, in conſequence of the moiſture: but from ſome more than others: and of theſe many were of a finger's length. Had I not ſuffered this graſs to ſtand, that I might have the ſeed, I am ſatisfied I could have mowed it thrice in the year; but wanting to collect as great a quantity as I could of the ſeed, I have not yet actually tried that experiment. I am very confident, however that this kind of graſs may be brought to afford eight tons of hay per acre in the year: and any perſon who may entertain doubts of the reaſonableneſs of this ſuppoſition, may have them cleared up by ocular proof, if they will take the trouble to call on me; as great numbers of gentlemen have already done, to their entire ſatisfaction in this point. The latter end of May, and the beginning of June, will be a proper time for ſuch inſpection; as this graſs, being a forward kind, will be fit to cut at that ſeaſon.

"This graſs has a peculiar quality, different from what is found in any other kind I ever knew before; which is that it had very ſhort joints, and that every joint ſends out ſhoots which ſtrike root whenever they touch the ground. On taking a full grown plant of the graſs out of the ground, it will be found, moreover, capable of being divided into twenty ſmaller roots or off-ſets, proper to be again planted: and theſe off-ſets, though taken thus from the root, even in the beginning of July, will bear ſeed the ſame year. If, likewiſe, when this graſs is ready to be mowed there ſhould happen to be much rain, no damage will enſue in waiting a month for fair weather. Becauſe, as this graſs is conſtantly ſending out ſhoots at every joint, it always keeps freſh; and does not wither, nor rot at the bottom, as other graſſes do: but, on the contrary, it

continues green, even till the ſeed is ripe, which is certainly a very ſingular property, and of great conſequence.

"The goodneſs of this kind of graſs may alſo be very obviouſly inferred from the following particular. When I had ſowed it, which was in the month of April, 1764, I had, as I have above declared, only one ounce and a half of ſeed: but betwixt that time and the preſent, I have found ſuch a ſurpriſing increaſe, that I have collected from the ſucceſſive crops of this ounce and an half, as much ſeed as has ſown two hundred and fifty acres of land; and have beſides, as much by me at preſent, as will ſow one hundred acres more.

"I ſhall not dwell any longer on the commendation of this graſs, than only to ſay, that it has every quality requiſite to make good hay. That it is eaſily propagated, and from a very ſmall portion of ſeed. That it is not ſubject to rot, or fall in patches, as moſt other kinds of graſs do. That it is a beautiful green at all times, and conſequently affords a moſt pleaſing verdure, when ſown in ſight of any houſe, or made part of any proſpect. And, laſtly, that the produce of hay from it is extremely great, being much more than any other kind of true graſs will yield. Of the truth of all this many perſons can witneſs, who have, on ſeeing the real trials reſpecting it, given the greateſt encomiums on it: I ſhall therefore proceed now to offer ſome directions for its culture.

"The ground on which the ſeed of this kind of graſs is intended to be ſown, is to be prepared in the manner that is proper for lucern: that is, it ſhould be well ploughed and harrowed; and cleared, as much as poſſible, from all weeds, in the ſame way as is done for barley. When the ground is well mellowed and ſweetened, the ſeed may be ſown: the quantity of which may be about one pound and a half per acre; and the time of doing it, from March to April.

"Before the bird-graſs ſeed be ſown, it will be proper to ſow as much barley or oats, as will afford half a crop, and ſuch barley or oats being harrowed in, the pound and half of bird graſs-ſeed ſhould be ſown over it: after which, in general caſes, the ground is only to be rolled the firſt opportunity when it is dry. But if the ſoil be ſandy or dry, it may be proper to give it a very light harrowing.

"This kind of graſs cannot be well ſown without ſome corn. Becauſe it is of ſo fine and delicate a nature, at its firſt coming up, that the weeds would overpower and choak it at that time: or a greater expence would be neceſſary for clearing them away by hand. But when this graſs is ſo mature as to be in the ſtate of a paſture, or fit to cut, it grows ſo cloſe and thick, that if a handful of money was thrown up over it, none would, when fallen, I am certain, reach the ground.

"As to the nature of the ſoil proper for the culture of bird-graſs, almoſt every kind will do very well for it; except, as has been obſerved before, ſuch as is too wet or moory; and this is one of the good properties of this graſs, becauſe few kinds flouriſh much on dry gravelly ground.

"This is a juſt account of the obſervations and experiments I have hitherto made on this valuable graſs; and they ſeem ſufficient to juſtify me, in endeavouring to render it known to the public, as an object worthy their attention."

BIRD'S-NEST, the name of a weed, otherwiſe called wild carrot. *See Wild* CARROT.

BISHOP, a little ſpotted beetle, commonly called the lady-cow, or lady-bird.

BISHOPING, a cant term made uſe of by horſe-jockies, implying the unfair practices they make uſe of to conceal the age of an old horſe, or the ill properties of a bad one.

BIT, *or* BITT, the iron part of a bridle, put into a horſe's mouth.

BLACK, a colour in horſes, eſteemed very beautiful, eſpecially when they are of a jet ſhining black, and well marked, without having too much white: for as a great deal of white, eſpecially when it ſpreads round their eyes, and a great way up their legs, adds nothing to their beauty, ſo neither does it add any thing to their goodneſs. The Engliſh black horſes have more white about them than the black horſes of any other country. The Spaniſh, Arabian, Dutch, and Daniſh horſes, ſeldom have much; though a ſtar or blaze, and ſometimes a white muzzle, and one or more of the feet tipped with white, always looks beautiful and lively, and is ſo far from being a diminution of the goodneſs of a horſe, that moſt think it an addition, from an opinion that horſes without marks are generally ſtubborn and ill-conditioned. Some black horſes have brown muzzles, are browniſh on their flanks, and between their hips. Theſe are often called black browns, as they are not a perfect black, but approach near to the colour of a tawny black hound; ſome are of a lighter colour about their muzzles, and are called mealy-mouthed horſes; and of theſe ſort are the pigeon-eyed horſes, which have a white circle round their eye-lids, and their fundaments often white. Thoſe that partake moſt of the brown, are generally the ſtrongeſt in conſtitution. *Gibſon on Horſes, vol.* I. *pag.* 46.

BLACK-GRASS, a ſpecies of graſs in America, of which the following account is given by the late Dr. Elliot of New England.

"We have, ſays that worthy writer, in a letter to Mr. Mills, an excellent ſort of graſs in our ſalt-marſhes. It thrives beſt, and grows largeſt, in thoſe meadows which border on tide-rivers, and have the greateſt mixture of freſh-water. Where the water is very ſalt it is not apt to fix and ſpread; but will remain ſhort and poor. It is very tender, and cuts as eaſily as garden cives, grows thicker and taller than the common ſalt-marſh graſs, and affords from two to three tons of hay to the acre: but it is a ſlow grower, after it has been cut. Its ſeeds are ſmall, like thoſe of tobacco. The colour of this graſs is a very deep green, which renders it ſo conſpicuouſly different from every other kind, that it is univerſally known by the name of black graſs.

"This ſpecies introduced itſelf long ſince the ſettlement of New England. Our firſt planters knew nothing of it; nor has it yet travelled very far ſouth weſt. Its firſt appearance in this colony was on a marſh at Saybrook, to which an old boat was brought down Connecticut river, by a great flood and there caſt up. This inclined me to think, that it was originally an inland graſs which happened to ſuit with ſuch ſalt marſhes as are well ſupplied with freſh water; and what confirms me in this opinion is, that a perſon in the town of Killingworth, where I reſide, having cleared a ſwamp far diſtant from ſalt water, and afterwards ſent into this freſh meadow, cattle which had been foddered with hay of the black graſs, had there in a ſhort time (undoubtedly by means of its ſeeds carried thither in the dung of theſe cattle) a fine growth of this very graſs, which has ſince not only eſtabliſhed itſelf, ſpread, extended, and, like a conqueror,

queror, beaten out the natural graſs; but looks as flouriſhing in that freſh medow, as any growing on a ſalt-marſh.

"I have a large tract of peat meadow, in which no graſs ſeeds will grow. I deſign to try the ſeeds of this black graſs in that dead freſh meadow, ſince the other ſorts which I have tried do not ſucceed. What encourages me to do this, is my having introduced it into a once uſeleſs, worthleſs moraſs, worſe indeed than nothing, though of conſiderable extent, for I was obliged to be at the expence of fencing it, for the ſake of other land. It was quite over-run with reeds, buſhes, and brakes.

"Between this land of mine and a creek of ſalt water, intervened three meadow lots belonging to other perſons. I obtained leave of the owners to cut a ditch ſix feet wide through their ground, and carried this ditch to the upper end of my land, where ſeveral croſs ditches were then dug, to invite in, and retain the ſalt water. The gaping mouths of theſe numerous ditches ſoon occaſioned a ſtrong indraught of ſalt water, and, in time, converted the main ditch into a proper tide creek. The ſalt water thus introduced has done wonders. It has not only killed the trees, buſhes, brakes, and levelled great inequalities, but has alſo introduced the black graſs, and thereby rendered an acre of that land, which was not worth any thing before, now worth thirty-five pounds of our currency.

"The ſalt water in its paſſage through my neighbours grounds has alſo done them great ſervice, by introducing this black graſs; and all this with ſmall expence." *Mills's Huſbandry. vol.* III. *p.* 416.

To this account of the black graſs given by doctor Elliot, we ſhall add the following, tranſmitted in a letter from that gentleman's ſon-in-law, the reverend doctor Gale.

"Its (the black graſs) early ſpring and growth, its lively green, its great produce, the preference given to it by cattle, when diſtributed promiſcuouſly with ſalt graſs for their food; its rendering the turf of mirey, looſe, dirty meadows, firm and ſolid, and its extraordinary quality when improved for paſture in the ſpring and ſummer raiſed its reputation, and endeavours were uſed to propagate it: but it proved very ſullen and uncertain in its growth; growing only where it liſteth, from the ſeed promiſcuouſly ſhed, and wafted about by the tide which overflowed the meadows.

"It is obſerved to grow and flouriſh well near the banks of rivers, which admit the ſalt water, and even in flat or low meadows, which are in ſome meaſure overflowed every tide by the ſalt water: but theſe low meadows muſt alſo be of that kind only, where there is a courſe of freſh water when the tide is out: ſo that a mixture of both freſh and ſalt water ſeems to be neceſſary for its prolific vegetation.

"It grows largeſt and beſt in reedy and ruſhy coves, or arms of the ſalt meadows, which are a little higher than the general level of the ſalt marſh, which are not commonly overflowed by the flux and reflux of the tides, which lie at ſome diſtance from ſalt creeks or courſes of ſalt water, and which are watered by freſh ſprings riſing from the banks or adjoining uplands.

"I have ſeen ſeveral ſuch meadows which flouriſh remarkably with this ſort of graſs, though but lately brought under culture: I am credibly informed, that eight acres of ſuch a cove produced this year thirty-two tons of black graſs in an adjoining townſhip.

"The black graſs is not near ſo much impregnated with ſalt as the common graſs is, when both of them grow together; and the dew which adheres to the black graſs is freſh, when that on the ſalt graſs is highly impregnated with ſalt.

"It thrives beſt on a clay or ſtrong loam. The natural turf ſhould be broken, and the ſeed, after being mixed with freſh cow dung, ſhould be ſpread, and faſtened in by treading, that it may not be carried off by the water: or it may be propagated by tranſplanting the turf taken from a black graſs meadow, by which means it will be made to ſpread a pace.

"It will alſo grow where ſalt water never reaches. I have ſeen it growing on moiſt upland, and the turf has been ſo firm, that it was hard work for ſix oxen to plough through it.

We ſhall only add, that the above gentleman has juſt ſent the Society for the Encouragement of Arts, &c. a conſiderable quantity of the ſeed of this black graſs; and that they have diſtributed it to a number of gentlemen, in order to their ſowing it on proper ſoils; ſo that there is great reaſon to hope that this valuable graſs will ſoon be as well known in England, as it is now in America.

BLACK-LAND, a name given to a particular ſort of clayey ſoil, which is rather a grey than a true black. But however pale it may be when dry, it always blackens by means of rain; and when ploughed up at thoſe ſeaſons, it ſticks to the plough ſhare; and the more it is wrought the muddier and duſkier coloured it appears.

Theſe ſorts of lands when ſomewhat fat, yet porous, light, and ſufficiently tenacious, are good both for corn, and graſs; but as they are moſtly in bottoms, ſo the wetneſs of them often ſpoils them for corn; but where they are dry, they are extraordinary fruitful, eſpecially for barley; they will bear alſo good wheat upon an erſh crop: but if they are ſo very rich, that you fear lodging of the corn, you may, if a deep mould, plant them with liquorice, or ſow them with hemp, woad, cole, rape ſeed, madder, or ſome other rich commodity, that beſt agrees with ſuch land; and afterwards with corn, when ſome of the fertility is abated. The natural produce of theſe lands is commonly thiſtles, docks, and all ſorts of rank weeds and graſs. It will bear excellent clover. The beſt manure is chalk, lime, dung, &c. *Mortimer's Huſbandry, vol.* I. *pag.* 75.

BLACK LEGS, a name given in Leiceſterſhire to a diſeaſe frequent among the calves and ſheep. In Staffordſhire they call it the wood-evil.

It is a white jelly, and ſometimes a bloody jelly, ſettling in their legs, from whence it has its name of black-legs, and often in the neck between the ſkin and the fleſh, which will make them carry their necks awry. If it falls on the joints they overcome it; but if on their bowels they die, nor is there any cure. *Liſle's Huſbandry, vol.* II. *pag.* 135.

BLACK OATS, a ſpecies of oats greatly cultivated in the northern parts of England, being eſteemed a very hearty food for horſes. *See the article* OATS.

BLACK THORN, a ſpecies of buſhes well known, and much uſed in making fences, &c.

It is not reckoned quite ſo good for fences as the white-thorn, becauſe it is apt to run more into the ground,

ground, and is not ſo certain of growing; but then the buſhes are much the beſt, and moſt laſting of any for dead hedges, or to mend gaps: nor are cattle ſo apt to crop them as the other. They will grow on the ſame ſort of ſoil with the white-thorn; but the richer the mould is, the more they will proſper. *Mortimer's Huſbandry, vol.* I. *pag.* 5.

BLADE, the ſpire of graſs, or green ſhoots of corn.

BLADE, alſo ſignifies the ſharp or ſtriking part of a weapon or inſtrument.

BLAIN, a diſeaſe to which cattle are ſubject in the ſpring of the year. Some think it is occaſioned by a little red worm which the cattle lick up. It often occaſions a bladder as large as a hen's egg under the tongue, and when this happens, the beaſt may be cured by breaking the bladder, and rubbing it with ſalt.

Others impute the diſeaſe to a ſudden riſing of the blood, and may be known by the beaſt's eyes running with water; and as the diſtemper advances, its eyes will ſwell, and, if bled under the rump, the blood will feel hot. In this caſe the following drench is recommended. Take a pennyworth of Engliſh liquorice, and an equal quantity of Engliſh anniſeeds, turmeric, long-pepper, horſe-ſpice, or diapente, all ground fine, and juſt boiled up in a quart of ſtrong beer; but if the heat of the blood indicates that the diſtemper proceeds from a hot cauſe, the horſe-ſpice ſhould be omitted. It is added, that if the bladder cannot be found under the tongue, the bum-gut ſhould be raked, where it will be found in the back. If a knife be run through the ear of a beaſt near the root, it will, according to the report of experienced graziers, prove a certain cure in this diſtemper, provided it be done before the beaſt falls. *Liſle's Huſbandry, vol.* II. *pag.* 127.

BLAST, the ſame with blight. *See* BLIGHT.

BLAZE, a white mark in a horſe's face.

BLEA, that part of a tree which lies immediately under the bark, or between that and the hard wood, and is the firſt progreſs of the alteration of the bark into wood, by the natural growth, and ſtrengthening of the fibres.

While the blea remains any thing ſoft, and retains ſomewhat of the nature of bark, it may maintain a feeble vegetation; but when it is grown abſolutely hard and woody, it can no longer contribute to carry on that operation.

BLEEDING, an operation frequently neceſſary among all kinds of cattle, particularly horſes; and conſiſts in opening a vein by means of an inſtrument called a fleam.

Thoſe horſes that ſtand much in the ſtable, and are full fed, require bleeding more than thoſe that are in conſtant exerciſe; but eſpecially when their eyes look heavy and dull, red and inflamed; or when they look yellow or inflamed in their lips, and inſides of their mouths; when they ſeem hotter than uſual, and mangle their hay. Theſe are all indications that require bleeding, and likewiſe to lower their diet till they have more exerciſe.

Young horſes ſhould be bled when they are ſhedding their teeth, which is a relief to them, and removes thoſe feveriſh heats, to which they are ſubject at that time.

The ſpring is always a proper ſeaſon for bleeding, becauſe their blood is then more luxuriant than at other times; and in ſummer it is often neceſſary to prevent fevers, always chooſing the cool of the morning, and keeping them cool the remaining part of the day.

Some bleed their horſes three or four times a year, or even oftener, by way of prevention. Theſe take a very ſmall quantity at a time, not exceeding a pint, or a pint and a half, only to give a kind of briſker motion to the blood, and by that means to preſerve or render it more thin and fluid, and to prevent its ſtagnating in the ſmaller veſſels, which indeed is the firſt beginning of almoſt all diſeaſes; but how far this ſucceeds, can only be known to thoſe who have practiſed it a ſufficient time. There is, however, this inconvenience from frequent bleeding, that it grows into a habit, which, in ſome caſes, cannot be eaſily broken off without hazard; and ſome horſes have been known to become weak from frequent bleeding, while others have had their necks ſo full of ſcars, that they are apt to inflame and feſter every time they are bled, which is always troubleſome, and often ends with the loſs of the vein. And therefore to prevent ſuch accidents, thoſe who bleed horſes ſhould not confine their operation to one place of the vein, as they generally do, but uſe themſelves to open it higher or lower as they ſee occaſion; and if they meet with any difficulty in bleeding in the neck veins, the plate veins, or any other large veins, that can be made to run a full ſtream, will equally anſwer the ſame end.

But the caſes that require bleeding moſt, are colds, fevers of almoſt all kinds, falls and bruiſes, which are ſometimes dangerous to horſes, becauſe of their great weight. Hurts and wounds of the eyes, ſtrains in hard riding, or drawing, and all other accidents where a ſtagnation of the blood may be ſuddenly expected, or where the ſmall veſſels may be broke, and the blood extravaſated. Thoſe horſes that refuſe their food after riding, or any ſort of work, require to be bled more frequently than others, to prevent fevers, and inward inflammations of the lungs, the liver, or any of the principal viſcera. Nor is it leſs neceſſary to bleed horſes at graſs, when the purgation is over, and they begin to gather fleſh, or at any other time, when they look heavy about their eyes, for that is a proper indication for bleeding; and ſome rank paſtures require more bleeding than others.

There are alſo other indications that require bleeding by way of prevention, viz. when any epidemic diſtemper prevails among the horſes; at ſuch times the ſound ones may be bled, to keep them, if poſſible, from being infected; and if the contagion continues, it may not be amiſs to repeat the bleeding once in two or three months, or oftener, but in ſmall quantities, for the loſs of too much blood may be hurtful in ſome times of contagion. It is likewiſe neceſſary to keep ſound horſes from the unſound, or to remove them into places where the infection has never ſpread itſelf. *Gibſon on the Diſeaſes of Horſes, vol.* I. *pag.* 218.

BLEYME, an inflammation in an horſe's foot, occaſioned by blood putrefied in the inner part of the coffin towards the heel, between the ſole and the coffin-bone.

There are three ſorts of bleymes; the firſt, bred in ſpoiled, wrinkled feet with narrow heels, are uſually ſeated in the inward or weakeſt quarter; the ſecond, beſides the uſual ſymptoms of the firſt, infects the griſtle, and muſt be extirpated, as in the cure of a quitter-bone. *See* QUITTER-BONE. The third is occaſioned by ſmall ſtones, or gravel, between the ſhoe and the ſole. For the

the cure they pare the foot, let out the matter, if any, and dreſs the ſore like the prick of a nail.

BLIGHT, a general name for various diſtempers incident to corn and fruit trees.

M. du Hamel treats that part of this ſubject which relates to corn in a very maſterly and inſtructive manner; dividing what we generally call blights into the following ſpecies, viz. empty ears, parched and ſhrivelled corn, glazed corn, abortive or rickety corn, barren corn, and fallen or lodged corn. The reader will find each under its proper articles, as EMPTY EARS, &c.

BLIND, deprived of the ſenſe of ſight.

Moon BLIND, or *lunatic*, a diſeaſe to which horſes are ſubject, the ſymptoms of which are no other than the forerunners of cataracts, and generally end in blindneſs.

Signior Ruini, ſays that experienced writer Mr. Gibſon, and moſt other foreign writers, both French and Italian, in treating the diſeaſes of horſes, have all of them reckoned the moon-blind ſymptoms as a peculiar diſeaſe of the eyes, without having any relation to a cataract, which they have conſidered apart, as another diſeaſe of the eyes, which ſhews they built more on books than experience. But from many years obſervation, I do not remember I have ever ſeen a cataract bred in the eyes of any other horſes than thoſe which were called lunatic, or moon-blind. The Arabians were the firſt that aſcribed ſo much to the moon in the diſeaſes of the human body: and after the decay of learning all over Europe, their ſuperſtitious notions were ſo firmly rivitted, and ſo univerſally prevailed, that they could not be eaſily exploded, even by the ableſt phyſicians, till the modern diſcoveries in natural knowledge made way for more ſolid improvements in the medical art; and therefore it is no wonder, that the firſt writers on the ſubject of farriery, notwithſtanding ſome of them were men of learning, ſhould fall in with all the common ſuperſtitions that had ſo long prevailed, and had ſo great an influence on the practice of phyſic.

Theſe writers have deſcribed this diſtemper as appearing at certain times of the moon, coming ſometimes at the new-moon; ſometimes at the full; and ſometimes in the wane of the moon; that it ſometimes returns once in three months; ſometimes once in two months, and in ſome not above once in ſix months: that the eyes look ſo clear when the diſtemper abates, that it is impoſſible to ſee any imperfection in them. But theſe obſervations are very liable to exception; for any one who has the leaſt knowledge of the eyes, muſt needs ſee, that when the diſtemper is the moſt abated, and the eye the moſt clear, it ſtill ſhews a remarkable weakneſs, and upon full trial, the ſight will be found defective. Neither could I perceive that the eyes were affected by any of the moon's periods, ſo as not to vary, unleſs by mere accident. And therefore theſe obſervations are neither of any great uſe to the knowledge of the diſtemper, nor to lead us into a right method of curing it when it happens.

I have already taken notice, that the ſymptoms which appear in the moon-blind horſes, are, for the moſt part, no other than the prognoſtics of breeding cataracts. Theſe ſymptoms generally make their firſt appearance, when a horſe is turned five, coming ſix, at which time one eye becomes clouded, the eye-lids ſwoln, and very often ſhut up; and, for the moſt part, a thin viſcid water runs from the diſeaſed eye, down the cheek, which is generally more or leſs in proportion, as the eye and eye-lids happen to be more or leſs ſwelled and inflamed; and in ſome conſtitutions, the inflammation is ſo great, and the humour ſo ſharp and corroſive, that it ſcalds and fetches off the hair wherever it comes. The veins of the temples and under the eye, along the ſide of the noſe, are alſo turgid and full: others run but little; nor is the humour very ſharp.

This diſorder is apt to come and go, till the cataracts are perfect and ripe, and then all pain and anguiſh, and the ſoreneſs and running of the eyes, go off with blindneſs, when the horſe is between ſeven and eight years old, this being about the time when moſt horſes are ſpread and come to their full growth; ſo that from its firſt appearance to its completion, is generally about two years, or two years and a half, during which time, ſome horſes have the returns of the diſorder, not only more frequently than others, but the ſymptoms alſo are more ſtrong and violent. In ſome the eye is not much diſturbed above a week, when it clears up again, and returns to its former ſtate. In ſome horſes the eye continues bad a fortnight or three weeks. In others a month or longer, before the diſorder goes off; and the time of the return, ſo far as I could obſerve in many horſes, was always uncertain, and could not be fixed to any period of the moon, as many have imagined, being ſometimes ſooner, ſometimes later, according to its predominancy, or according to the treatment a horſe meets with from his farrier and keeper. Some have their returns once within the ſpace of two or three months; ſome within the ſpace of four; and, with the greateſt care and pains, the diſorder ſeldom keeps off above five months, without a relapſe.

This is uſually the caſe of thoſe moon-blind horſes, which have their eyes ſtrongly infected with a hot ſharp humour, that ſhuts them up with ſwelling and inflammation. But there is another kind of moon-blindneſs, which is alſo the forerunner of cataracts, where no humour or weeping attends the eye. It is never ſhut up or cloſed, as in the caſe above deſcribed, but will now and then look thick and troubled, at which time the horſe ſees little, and, perhaps nothing diſtinctly. Here the eyes always appear ſunk and periſhing, though the cataracts do not become ſo ſoon complete, as in thoſe that are full, and where a humour is predominant; nor is it unuſual in this caſe for one eye to eſcape, whereby a horſe will retain ſight to guide him, ſo as to render him fit for common drudgery.

The cauſes of this diſtemper are various, and when it proceeds from a natural defect in the eyes, it may no doubt be hereditary; but in a horſe that has naturally good eyes, and yet turns moon-blind, it is uſually owing to ſickneſs, or ſome other malady that has terminated in the eyes; though we ſeldom ſee horſes turn moon-blind and breed cataracts, but where the eyes are naturally in fault. Theſe eyes are, for the moſt part, faulty, that are very large and prominent, or very flat, ſmall, and ſunk; both which defects in the eyes of horſes are liable to blindneſs, though they differ in their manner; and therefore colts, that have large eyes, that run abroad, always feed with their heads downwards, and are continually expoſed to the ſun in hot weather, may eaſily contract an habitual weakneſs in their eyes, eſpecially as the blood and juices of all young animals are naturally of a viſcid and balſamic texture, and thence may be the more eaſily retarded in the veſſels of the eye, which are exquiſitely fine. Theſe cauſes produce weakneſs and relaxation in the eyes, and this ſtill increaſes till the blood is in that ſtate, which we may reaſonably,

ſonably ſuppoſe to continue till a horſe is done ſpreading, and turned ſeven, for then the cataracts generally grow complete. On the other hand, when the eyes are flat, and lie deep within their orbits, the ſurface of the eye being alſo flattiſh, the rays of light falling directly upon the pupil, and theſe not being ſufficiently refracted, as they are in thoſe eyes that are more convex, or of a rounder make, muſt needs weaken the eye, affect the optic nerve, and conſequently weaken the tone of the muſcles. And, perhaps, this may be the reaſon why the eyes periſh and decay, while the cataracts are growing.

The ſigns of this diſtemper may, in ſome meaſure, be deduced from what has been already obſerved; viz. ſwelling and inflammation of the eyes alternately, ſometimes one eye, and ſometimes the other, with a running of a thin watery ſerum, which is often ſo hot and ſcalding, as to fret off the hair. In others the eyes run but little, and ſome not at all; but look deadiſh, ſunk, and periſhing. In all moon-blind horſes, the eyes are ſometimes tolerably clear, at other times thick and muddy, of a wheyiſh colour, or a duſky yellow; and when this happens, a moon-blind horſe ſees but little, and when he is brought out into the light, he takes little notice of any perſon or object that is near him, but always looks upwards, with his head raiſed, lifts his feet high, and ſets them down with fear. Though in this diſtemper the humour ſhifts from one eye to the other by turns, and at ſome intervals ſeems to go off, yet when the eyes of ſuch horſes are at their beſt, they look weak, and with a deadneſs, and when any ſuch horſe has his head held up, the weakneſs of the muſcles, and of the whole eye, is eaſily perceived.

When this diſtemper happens to horſes that have large full eyes, reſembling thoſe of a calf, and when the humour continues by long periods, and the returns are frequent, there is great danger of blindneſs. If the eyes be of a moderate ſize, well formed, and the periods or returns of the diſtemper ſhort; if the horſe ſees perfectly when the humour goes off, and the eyes in thoſe intervals look clear, the horſe may recover. When the humour attacks one eye without changing to the other, there is alſo hopes of a cure, at leaſt, of ſaving one eye. But when the eyes look flat and depreſſed, and decay gradually, it is generally the forerunner of blindneſs; for in this caſe the nerves and muſcles of the eyes are affected, and the cataracts always grow in the progreſs of the diſtemper. Here, however, as in the preceding caſe, when the diſtemper ſeizes only one eye, the other may be ſometimes ſaved, and when this happens, the remaining eye generally grows ſtronger when its fellow is gone. But when the diſtemper proceeds from a violent cold, as ſometimes happens, whereby we often ſee the eyes ſwoln, and quite ſhut up, though the horſe may be threatened with blindneſs by ſeveral returns, yet by good management it may ſometimes be prevented, and the eyes recover. Nor does the diſtemper always prove incurable, when the eyes are darkened with a yellow cloud, provided the eye be not naturally bad, and the above ſymptom of long continuance. In all caſes of moon-blindneſs, the moſt promiſing ſigns of a recovery are when the attacks come more ſeldom, and their continuance grows ſhorter: or when the inflammation and ſwelling in thoſe eyes that are naturally full and large abates. Alſo, when the eyes, that looked ſunk and periſhed, grow more plump and full; and when in either the cornea looks clear and tranſparent, without muddineſs, and the horſe looks more attentive to his way, and goes on without much fear o ſtartling; all theſe are promiſing ſigns, and with goo and careful management he may recover.

The moſt difficult part ſtill remains to be treated of namely, the method of curing this diſorder, for few moon-blind horſes eſcape; and when it is hereditary, o the eyes naturally defective, it is not adviſable for any one to be at much expence and trouble to ſave them, a there is great reaſon to fear he will meet with a diſappointment. We, however, ſometimes ſee moon-blind horſes, at leaſt ſuch as have many of the ſame ſymptoms, recover and do well, even beyond expectation.

If the eyes are large, full, ſwoln, and inflamed, the horſe ſhould be bled at proper intervals ſometimes in the neck, and ſometimes backward, to make a revulſion. But where the eyes appear ſunk or periſhing, bleeding is often pernicious. After bleeding, for thoſe that are full and run a thin ſharp water, make a ſtrong tincture of roſes in the following manner:

> Take two drams of red-roſe-buds, either freſh or dried, infuſe them in half a pint of boiling water in the manner of making tea; when it has ſtood to be cold, pour off the infuſion, which will be of a reddiſh colour.

In four ounces of this tincture diſſolve half a dram of ſugar of lead, and waſh the horſe's eyes, and all over his eye-lids, with a piece of ſponge, or a clean bit of rag, twice a day. If the matter digeſt and thicken, which uſually happens before it abates, add to the whole quantity of this tincture about two drams of honey (which will diſſolve in the fluid, by holding the phial near the fire, and ſhaking it) and uſe it as before. At the ſame time, if the parts near the eye be hot, and the veins over the face, and along the ſide of the noſe be turgid and full, bathe thoſe parts frequently with the beſt vinegar, verjuice, or vinegar of roſes, till the heat and running of the eye abates, the veins ſink, and become leſs apparent, and the eye begins to look clear. In the mean time ſome lenient mild purges may be adminiſtered, ſuch as the following:

> Take lenitive electuary and cream of tartar, of each four ounces; ſyrup of the juice of buckthorn berries, two ounces; mix theſe with white wine and water, warmed, about a pint, and give it faſting.
>
> Or,
>
> Take lenitive electuary and cream of tartar, of each four ounces; Glauber's purging ſalts, three ounces; the ſolutive ſyrup of roſes, two ounces; to be mixed with white wine and water, or warm water-gruel.

Either of theſe may be given to moon-blind horſes. The latter is rather the more mild and cooling, and exceeding proper if the horſe be fat and full of blood, and will work ſo gently, that it may be repeated twice a week, till the eye becomes clear, and attains its uſual brightneſs.

The horſe ſhould have feeds of ſcalded bran while theſe lenitives are given him, and he may have moderate exerciſe, or may be made uſe of in any kind of eaſy buſineſs; for theſe draughts, for the moſt part, work off in about

about two hours. But as the blood, in all theſe caſes, is generally ſizy, and as this diſpoſes young horſes to frequent returns of the diſtemper, it is therefore neceſſary to adminiſter ſuch things as may attenuate the juices, and preſerve them in a more fluid ſtate. Theſe are called alteratives, becauſe their property is gradually to alter the ſtate of the blood. The following has been often uſed, in this and many other caſes, with great ſucceſs:

Take the fineſt ſuccotrine aloes, half an ounce, or ſix drams; cream of tartar half an ounce; freſh jallap, in fine powder, and ſalt of tartar, of each one dram; make the whole into a ball, with a ſufficient quantity of oil of amber, and roll it in liquorice powder.

One of theſe balls may be given every week, in the manner of a common purge, with ſcalded bran, and his water milk-warm. The firſt day it will work plentifully by urine, and the day following both ways; but no more than juſt to empty his guts, unleſs when there is a foulneſs, by reaſon of a redundant ſlime or greaſe; when it will often work very powerfully two or three days, without the leaſt diminution of the horſe's ſtrength, or loſs of fleſh. Theſe alterative purges ſhould be continued for a month or ſix weeks, and after omitting another month to begin again; in all which time the horſe may be kept in any common buſineſs, except hunting, going journies, or any other laborious exerciſe.

In the intervals between the purges it will be proper to give him an ounce of crude antimony every day, made into a fine impalpable powder, in one of his feeds, which may be continued for three months or longer. But if the horſe be of value, inſtead of crude antimony, he may have powders compounded of native cinnabar, or cinnabar of antimony, and gum guaiacum, equal parts, giving him an ounce every day, till he has taken two or three pounds; and after an interval of about three months, to proceed in the ſame method till the eyes look ſtrong and clear, and the horſe ſhews no ſigns of blindneſs, or any defect in his ſight or weakneſs in his eyes. Several gentlemen have followed this method with good ſucceſs, where the eyes have been full, and no way periſhed. A pound of guaiacum wood boiled in three gallons of water till it is reduced to two, is a cheap remedy, and may be profitably adminiſtered to horſes of ſmall value. It promotes perſpiration, dries up ſuperfluous humidity, ſtrengthens the ſolids when relaxed, and ſweetens the blood. It may be given a quart or two every day, in a horſe's water, and will have a good effect to prevent moon-blindneſs, where it is not hereditary, nor proceeds from a natural defect in the eye.

But when the eyes are ſunk and periſhing, and the eye-brows are pinched at their inner corners next the noſe; when there is little or no inflammation or running, except a more than ordinary moiſture in the carncle, or haw of the eye, or where there is no moiſture at all, as we often find in many moon-blind horſes: wherever theſe ſymptoms are, a method of cure is required quite different from the preceding. For as we ſuppoſe here the nerves of the eye to be affected, and the ſupplies of the arterial blood by that means denied; whereas, wherever the fault may be, whether originally in the blood or in the nerves, it is neceſſary, in either caſe, to adminiſter ſuch things as not only attenuate the blood, but may cauſe a greater derivation thereof to the eye: ſo that the moſt likely way to ſucceed is by the proper uſe of mercurials; and theſe ſuch as are the moſt efficacious, and at the ſame time the moſt ſafe. But firſt of all let the horſe have the laſt mentioned purge given him by way of preparation, and when the operation is over, which will be mild and gentle, the following ball may ſucceed:

Take mercurius dulcis that has been often ſublimed and dulcified, two drams; make it into a ſmall ball, with a ſufficient quantity of conſerve of red roſes, and wheat flour.

Let this ball be given early in the morning faſting, and tie up the horſe from eating two or three hours after it; then let him have a feed of ſcalded bran, with warm water, or warm gruel to drink; which regimen ought to be continued the whole time he is under this courſe of mercurial and purging phyſic; cold water and other cold drinkables, being ſomewhat unſafe at ſuch a time. The mercurial ball may be repeated every other day, in the morning, till the horſe has taken three or four. If his mouth grows tender, which may poſſibly happen, if he be not of a pretty ſtrong conſtitution, he muſt be fed with water-gruel for two or three days, till that ſymptom wears off. At the ſame time the purge may be repeated once or twice, and the following eye-water applied outwardly to both his eyes, if both be weak and diſordered:

Take crude ſal ammoniac, cleaned from the black ſcurf that is uſual on the outſides of the cakes, two drams; diſſolve it in a pint of warm-water, or the above tincture of roſes; and add to it a gill of ſpirit of wine, or the beſt brandy, ſhaking them together in a quart bottle.

The eyes may be bathed all over with this mixture, twice a day, or it may be uſed in the manner of a fomentation, by wringing cloths out of it, and applying them warm over the eyes. This will act as a ſtimulus, and may alſo help to thin and rarify the gummy juices, and bring new ſupplies of nouriſhment to the periſhing eyes. At firſt it may cauſe a little ſmarting; but after uſing it a day or two that ſymptom goes off, and if the eyes grow more plump and full, there will be hopes of a recovery, at leaſt of ſaving one eye; and therefore the beſt way upon this proſpect is to proceed in the ſame method, after a month's interval, and ſo on, as you find encouragement. And in all the intervals, the powders mentioned above, ſhould be given in all his feeds, or the decoction of guaiacum in his water.

Some take up the eye veins to prevent blindneſs, but without diſtinction, whether the eyes are full with redundant humours, or ſunk and periſhing. In the latter caſe the taking up the veins may poſſibly be of ſervice, becauſe by that means the eyes may be better ſupplied with its proper nutritive juices; but this too is uncertain, becauſe the fault may be in the nerves, or the diſtemper may proceed from ſome original configuration of the eye, which may be defective, and then ſuch operations are like to prove fruitleſs. But the taking up the veins where the eyes are full, muſt, for the moſt part,

prove hurtful, by cutting the channels which ſhould convey the blood and juices from thence in the courſe of circulation, and conſequently increaſe the diſtemper, inſtead of abating it. In this caſe the taking up the arteries might be of ſome ſervice; but this is an operation that only perſons well ſkilled in the anatomy of a horſe, ſhould preſume to undertake, and in the end might perhaps be uncertain.

The cutting out the haw is another operation uſually performed on moon-blind horſes. The haw is a ſwelling or ſponginess of the caruncle or fleſhy ſubſtance in the inner corner of the eye next the noſe, and when it is ſoaked with too much moiſture and humidity it ſwells and turns ſpongy. The membrane to which it adheres alſo grows thick, and ſpreads itſelf ſo as to cover a conſiderable part of the eye, but ſeldom reaches ſo far as to cover any part of the pupil. The ligament which runs along the verge of this membrane becomes horny; and when it riſes to this ſtate, it compreſſes the eye-ball like a hoop, and by its continual preſſure cauſes conſtant pain, and increaſes all thoſe bad ſymptoms that are the fore-runners of blindneſs. Haws grow ſometimes in eyes that are not naturally bad, after colds and ſurfeits; but moon-blind horſes are ſeldom without them; and wherever this ſymptom appears, that the haws grow large and ſpongy, and derive a drain of humours upon the eye, the operation becomes neceſſary, and is performed by taking hold of the membrane with a ſmall hook, and cutting off ſo much of the caruncle as looks moiſt and ſpongy, with part of the membrane and griſtle that cauſe a preſſure on the eye. When this operation is well performed, it does great ſervice, and often recovers horſes that are not ſubject to cataracts; and even in this caſe it makes the eyes look ſomething better, and helps to protract the blindneſs, but will not prevent it when it is hereditary. This is an eaſy operation, and what almoſt every farrier pretends to; but they are apt to cut off too much of this ſubſtance, and by that means weaken the eye, and forward the blindneſs, inſtead of preventing it. The proper application after cutting out the haw, is honey of roſes, or rather tincture of roſes, with a little honey diſſolved in it. But if the eye continue ſtill to abound with moiſture, after the haw is extirpated, and threatens a freſh fungus, the caſe may be deemed bad; and then it will be neceſſary to blow into it a ſmall quantity of burnt alum and fine loaf-ſugar, equal parts, once or twice a day; or one part of white vitriol, and two parts of ſugar; and in ſome caſes it may be touched with the blue vitriol-ſtone, or the lunar cauſtic; but theſe violent ſymptoms ſeldom happen, and when they do, we may ſuppoſe the blood to have a very bad diſpoſition: ſo that it will be hardly worth while to attempt a cure, conſidering both the length of time, and the uncertainty of ſucceſs. *Gibſon on the Diſeaſes of Horſes, vol.* I. *pag.* 326.

BLINDNESS, a want of ſight. The ſheep in ſome parts of Wiltſhire are troubled with a blindneſs, and are cured by anointing their eyes with gooſe-dung. *Liſle's Huſbandry, vol.* II. *pag.* 212.

BLISTERING *ointment*, a name given by farriers for a ſort of charge or plaſter for raiſing a bliſter in horſes. There are various preſcriptions for making this ointment, but the following is equal to any yet known:

Take nerve and marſhmallow ointment, of each two ounces; quickſilver one ounce, thoroughly broke with an ounce of Venice turpentine; Spaniſh-flies powdered, a dram and a half; ſublimate one dram; oil of origanum, two drams.

BLOOD, a red liquor circulating through the veins, arteries, and other veſſels of animal bodies; and ſerving for the ſupport of life, and nouriſhment of all their parts.

Blood is an excellent manure for almoſt any ſort of ſoil. Mr. Evelyn tells us, that after the battle of Bagnam-fields, in Devonſhire (where lord Hopton obtained a ſignal victory) the blood of the ſlain fertilized the land, which had been ſown with corn a little while before, to ſuch a degree, that moſt of the wheat-ſtalks of the enſuing crop bore two, three, four, nay ſeven, and ſome even fourteen ears; a thing almoſt incredible. The owner of the land ſeeing how miſerably it had been trodden down, thought of reſowing it; but was diſſuaded from that deſign (perhaps to make the experiment) and had the above-mentioned ſurprizing crop." The huſbandman ſhould, therefore, be careful to procure the offals of the ſhambles, where they are to be had, as they will prove an excellent manure.

BLOOD-*letting*. *See the article* BLEEDING.

BLOOD-*ſpavin*, a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted by bathing the part twice a day with vinegar or verjuice; or let it be fomented with a decoction of oak-bark, pomegranate, and alum, boiled in verjuice, binding over it, with a roller, a woollen cloth ſoaked in the ſame, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and, if early applied, will frequently remove the diſorder: but if by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and waxed thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together. *Bartlet's Farriery, pag.* 279.

BLOSSOM, a general name for the flower of plants, but more eſpecially of fruit-trees.

BLOSSOM, or *peach coloured horſe*, is one that has white hairs intermixed all over with ſorrel and bay hairs.

BLOW-MILK, ſkimmed, or floten-milk: that from whence the cream is blown off.

BLOWN, ſwelled or hoved. *See the article* HOVED.

BLUE-BALL, a name given to the cone-wheat in Somerſetſhire, from the dark colour on the edge of the huſks of the chaff, which cover each grain, and the falling off of the awms when ripe; ſome of the ears having awms, and others none. *See the article* CONE-WHEAT.

BLUE-BOTTLE, *knapweed*, *matfellon*, or *centaury*, the name of a weed abounding in many corn lands, flowering in July, and ripening its ſeeds in autumn.

Mr. Miller ſays the corn-blue-bottle is an annual plant; but Mr. Ray and Mr. Liſle think its root is perennial; becauſe, as the latter obſerves, it not only puts forth

forth new buds every ſummer at the root for the growth of the next year, but ſeems alſo not to ſeed early enough, before the corn is cut, to propagate itſelf by its ſeed in corn-lands, in which it moſt abounds, eſpecially in a gravelly ſoil.

BLYME, the ſame with bleyme. *See* BLEYME.

BOAR, the male ſwine. *See the article* HOG.

BODY *of a horſe*, the material part or ſubſtance of a horſe, uſually called his carcaſe. *See the article* CARCASE.

BOG, properly ſignifies a quagmire, covered indeed with graſs, but not ſolid enough to ſupport the body; in which ſenſe it differs from moors or fens only as a part from the whole. *See the articles* MOOR and FEN.

Mr. King, in his account of the bogs in Ireland, publiſhed in the Philoſophical Tranſactions, Numb. 170, imputes the true cauſe of them to want of induſtry.

"The ſprings, ſays he, with which Ireland abounds, are generally dry, or near dry in the ſummer time, and graſs and weeds grow thick about the places where they burſt out. In the winter, they ſwell, run, and ſoften, and looſen all the earth about them. The ſward or ſcurf of the earth, which conſiſts of the roots of graſs, being lifted up and made fuzzy by the water in the winter, as I have ſeen it lifted up a foot or two at the head of ſome ſprings, is dried in the ſpring, and does not fall together, but withers in a tuft, through which ariſes new graſs; which is alſo lifted up the next winter. By this means the ſpring is more and more ſtopt, and the ſcurf grows thicker and thicker, till at firſt it makes that which we call a quaking-bog; and as it grows higher and drier, and the roots of the graſs, and other vegetables become more putrid, together with the mud and ſlime of the water, it acquires a blackneſs, and grows into that which we call a turf-bog. I believe that when the vegetables rot, the ſaline particles are generally waſhed away with the water, as being apt to be diluted in it. The oily, or ſulphureous, are thoſe which chiefly remain, and ſwim on the water; and this is that which gives turf its inflammability.

"I muſt confeſs, that there are quaking-bogs cauſed otherwiſe. When a ſtream or ſpring runs through a flat, the paſſage, if not tended, fills with weeds in ſummer, trees fall acroſs it, and dam it up: then, in winter, the water ſtagnates farther every year, till the whole flat is covered. Afterwards, a coarſer kind of graſs ſhoots up, peculiar to theſe bogs. This graſs grows in tufts, its roots conſolidate together, and its height increaſes every year; inſomuch, that I have ſeen it as tall as a man.

"This graſs rots in winter, and falls on the tufts, and with it the ſeed, which ſprings up the next year, and ſo ſtill makes an addition. Sometimes the tops of flags and graſs are interwoven on the ſurface of the water, and this becomes by degrees thicker, till it lies like a cover on the water: then herbs take root in it, and by the matting of their roots it becomes very ſtrong, ſo as to bear a man. I have gone on bogs which would riſe before and behind, and ſink where I ſtood, to a conſiderable depth; under which was clear water.

"As a farther proof that want of induſtry in the principal cauſe of bogs, Mr. King obſerves, that the higheſt mountains in Ireland being full of ſprings, and uninhabited, are over-run with bogs, as well as the plains, becauſe no care is taken to clear the ſprings.

"Ireland, continues he, abounds in moſs more than, I believe, any other kingdom. This moſs is of divers kinds, and that which grows in bogs is remarkable. The light ſpongy turf is nothing but a congeries of the threads of this moſs, as I have frequently obſerved, before it be ſufficiently rotten. The turf then looks white, and is light. I have ſeen it in ſuch quantities, and ſo tough, that the turf-ſpades could not cut it. In the north of Ireland, they call it old-wives tow, being not much unlike flax. The turf-holes, in time, grow up with it again; and all the little gutters in bogs are generally filled with it. To this I chiefly impute the red or turf bog; and from the ſame cauſe even the hardened turf, when broken, is ſtringy; though there plainly appear in it parts of other vegetables: and I am almoſt from ſome obſervations, tempted to believe, that the ſeed of this bog-moſs begets heath, when it falls on dry and parched ground. However, the moſs is ſo fuzzy and quick growing a vegetable, that it greatly ſtops the ſpring, and contributes to thicken the ſcurf, eſpecially in red bogs, where I remember to have obſerved this moſt particularly."

A flat ſpot of ground, lower than the level of an adjoining river or lake, may alſo give riſe to a bog; for when that part is filled up by the ſlime and earth brought from the ſurrounding grounds, and the rotten plants and animals, which are buried in it, have choaked it up, it will become a bog; and then the water will continue to flow into it from the river or lake, eſpecially when either of theſe is ſwelled by a fall of rain, or melting of ſnow. Theſe waters may alſo ſometimes have this effect, without a communication above ground, by ſoaking through a ſandy or gravelly ſoil.

Another cauſe of bogs have frequently ariſen from the fall of a number of trees, which, being neglected, have neceſſarily occaſioned a ſtagnation of the water brought down from higher grounds; ſo that the earth and other ſoil conveyed with it, have of courſe remained among the fallen wood, and given birth to a moſſy ground, which, it is plain from hence, is not an original ſoil. Coarſe graſs, and weeds which cattle will not eat, ſpring up in theſe places, and die there, after ſhedding their ſeeds, which, being prevented from rotting by the bituminous acid in the moſſy-water, produce new plants; ſo that, this being repeated every year, an annual addition is made to the depth of the moſs.

Draining of BOGS. Among the many and great inconveniencies which neceſſarily ariſe from bogs, Mr. King mentions the following, as cogent reaſons why every endeavour ſhould be uſed to bring them, firſt to a leſs hurtful ſtate, and afterwards to a condition in which they may be of ſervice to mankind.

"The fineſt and ſmootheſt plains, which generally ſhould be meadows, are often covered with uſeleſs, too often with really pernicious bogs. Theſe bogs are a great deſtruction to cattle, the chief commodity of Ireland. In the ſpring time, when the cattle are weak and hungry, the edges of the bogs are commonly cloathed with graſs, and the beaſts, in venturing to get it, fall into pits or ſloughs, where they are either drowned, or, if they are found, hurt, and often maimed, in the pulling out. The fogs and vapours which ariſe from theſe places are commonly putrid, ſtinking, and very unwhol-

ſome: for the rain which falls on them, ſtagnating upon their ſurface, and in their hollows, than which there is hardly any ſubſtance, equally ſoft, more impenetrable by water, corrupts there, and is exhaled by the ſun; ſo that, very little of it running off, it muſt of neceſſity affect the air. They corrupt other water, both in its colour and taſte: for the water which ſtands in the pits, or lies on the ſurface of the bog, is tinctured by the reddiſh-black colour of the turf; and when a ſhower comes, ſo as to make theſe pits overflow, the water which runs from them tinges all it meets, and gives its colour and ſtench even to many rivers. The only advantage derived from any bog, is turf for fuel. It makes a tolerable ſweet fire, in the common way of uſing it; and is, when charred, perhaps, the ſweeteſt and wholeſomeſt thing that can be burnt, fitter for a chamber, and for conſumptive people, than either wood or coal.

"All the inconveniences of our bogs, continues Mr. King, may be remedied, and they may be made uſeful to us, by draining: for I never obſerved one bog without a fall ſufficient to drain it, nor do I believe there is any. The great objection againſt this improvement is the expence: in which I cannot but think the people are often terrified without ſufficient cauſe. One trench will drain many acres in quaking-bogs, which, when dry, are generally meadow, or the beſt grazing ground. Every red bog has about it a deep, marſhy, ſloughy ground, which is called the bounds of the bog. A deep trench round ſuch a bog keeps out cattle, and turns the bounds into good meadow. I remember a red bog of ſixty acres, which a gentleman reduced to a good grazing ground, worth three ſhillings an acre, for twenty-five pounds, which is leſs than three years purchaſe. In all improvements of this kind, gentlemen ſhould conſider, that what they lay out goes by degrees, ſo that they ſcarcely feel it; that it goes among their tenants, whom it helps to enable to pay their rent; that they do a work of charity in employing the poor; and that they at the ſame time contribute to both the ornament and general profit of the kingdom.

"The deep trench before mentioned, round a red bog, not only drains and improves the bounds of the bog, as I ſaid before, but goes a great way towards drying the bog itſelf. It ſerves likewiſe as a common ſink, into which all the drains vent themſelves. Theſe drains ſhould be cut ſo as to croſs the little ſloughs that run in the bog. The firſt drains ſhould not be above two or three feet deep, or wide: for the bog is ſo ſoft, that deep trenches will not ſtand, but fill up again. When the ſurface of the bog is cut in little trenches, ſuppoſe at twenty, thirty, or forty perches diſtance, it will ſoon be ſo dried that cattle may graze on it all the ſummer. A year or two after this, by which time the bog will be ſomewhat dry towards the ſurface, the drains may be made ſix feet wide, and as deep as the ſoftneſs of the bog will permit. This will certainly make the bog uſeful for grazing; and at the end of another year or two, an attempt may be made to cut one or two of the trenches down to the bottom of the bog; for till that be done, I do not reckon the bog ſecured. A gentleman may oblige all his tenants to cut their turf in theſe trenches, and likewiſe have his own cut there." *Philoſophical Tranſactions, Numb.* 170.

Small bogs may be turned to very good account by planting them with oſiers, willows, and alders: but where the extent is conſiderable, this object becomes of too little conſequence. Draining will be however neceſſary before they can be improved any other way; as a previous ſtep towards which, it will be neceſſary to examine from whence their too great quantity of water ariſes, and what retains it. When the cauſes are known, their effects will be the more eaſily removed.

The ſources from whence the too great quantity of water proceeds, may either be without or within the bog. This is eaſily diſcovered by the greater quantity of water in one place than in another, and obſerving that the water ſpreads from thence, even under the ſurface, as through a ſponge.

If the water from without comes from neighbouring grounds, it is uſually kept off by a ſurrounding ditch, made large enough to contain the quantity that may at any time flow down, and by extending that ditch to the moſt convenient outlet, according to the declivity of the ground. If the bed of gravel or ſand through which the ſprings within the bay run, be cut quite through, the ſource of thoſe ſprings will certainly be deſtroyed; and if that bed be only opened in digging this ſurrounding ditch, the water will ſo readily diſcharge itſelf thereby, that the ſprings will probably be dried up.

Before any drain be made in the bog itſelf, an exact level of the ground ſhould be taken; and when the too great moiſture proceeds from a ſpring or ſprings within the bog, a large ditch ſhould be made, beginning at the loweſt part of the bog, where an outlet can be had, and continued from thence to the ſpring. If the bog be firm enough to bear it, this ditch ſhould be dug down to the very bottom of the bed on which the peat or moſs is formed, which in caſe of ſprings, is always gravel or ſand: for otherwiſe the water would force itſelf a paſſage in another part, and ſo make it neceſſary to extend the ditch thither. If there be more ſprings than one, the main ditch muſt be extended to each of them. In all caſes, the ſureſt way is to dig the ditch, where it can be done, at leaſt a foot deeper than the ſpring lies. Between the principal ditches cut in the bog, there ſhould be ſmaller, emptying themſelves into thoſe larger, to carry off the remnant of ſtagnating water, and to preſerve the ſurface dry. Care ſhould be taken not to lay the earth dug out of any of theſe ditches too near their ſides, leſt its weight ſhould make them fall in.

Bogs are generally higher than the land about them, and higheſt in the middle; the chief ſprings that cauſe them being generally about the middle, from whence they extend by degrees, and puff up the earth in ſuch a manner, that perſons are often apt to think the ſprings lie deeper than they really do. A ſure way to know whether the ditch be deeper than the ſpring, is to obſerve whether the water comes in at its bottom, or through the ſides. The width of the main ditch ſhould be proportioned to its depth; and both will, in a great meaſure, depend upon the quantity of water neceſſary to be drained. In general, it ſhould widen progreſſively from its head to its outlet, becauſe the quantity of water in it will be conſtantly encreaſed. The ſides of the ditch ſhould always be dug either more or leſs ſloping, according to the ſoil. If the ground be very looſe and light, and conſequently very liable to fall in, it will ſometimes be neceſſary to make a ſlope ſo great, that the top of the ditch will be four times as wide as its bottom. If the ſoil be ſtiffer, the ſlope may be leſs; but no ditch ſhould ever be dug quite perpendicular.

If

If a deep trench be cut through a bog, the original ſpring will be found, vaſt quantities of water will iſſue from it, and the bog will ſubſide. Mr. King ſays that he was informed that the bog at Caſtle-Forbes, where this was done, ſubſided thirty feet, a fall which ſeemed indeed incredible: but he found by computation that it could not be leſs than fifteen.

Mr. Elliot's contrivance for draining a bog, or what he calls a ſhaking meadow, containing about forty acres, deſerves to be mentioned, for the ſingularity as well as the uſefulneſs of the invention. The ſurface of this ground, over-run with cran-berry vines and wild graſs, ſeemed to be only a ſward of their roots laid over a pappy mud, and was deemed ſo poor that nobody would rent it. At the ordinary outlet of this meadow, there was a ſufficient fall, but very rocky, ſo that it was neceſſary to dig four or five feet to take advantage of it. In March, when this gentleman went to make the outlet drain, the torrent of water was ſo great, that nothing could be done in the uſual way. He therefore ordered a tree to be felled acroſs the brook, and pieces of plank, the upper ends of which reſted againſt the tree, to be driven down aſlant into the mud. The chinks and crevices of theſe planks were then cloſely ſtopped with tow, by which means the water was ſhut into the meadow. The trench or main ditch was then worked at in the day, and the water let out at night, till the drain was completed. When the weather grew ſufficiently warm, and the meadow was a little ſettled, croſs ditches were cut, one on each ſide, and another in the middle, and, ſo far as they extended, the meadow ſoon became firm and dry. "Some, adds Mr. Elliot, are deterred from ſuch an undertaking as that of draining their land, by reaſon of the great charge. They terrify themſelves without reaſon. When I was about to cut my main drain, ſome thought it impoſſible; others, that it would coſt, at leaſt, an hundred pounds. The place was full of rocks, ſome of which we dug up, others, were broken with ſteel wedges, and others were blown up with powder. The whole expence did not exceed twenty pounds." *Eſſay* I. *on Field Huſbandry*, *p.* 7.

When the ditches and trenches are finiſhed, great care muſt be taken to keep them in good and laſting condition, leſt all the labour beſtowed upon them ſhould be loſt.

There are different ways of doing this. If the ditches are left open, they muſt be well cleanſed from weeds and mud, twice every year, once in the ſpring, and once in the autumn. It will alſo be right to drive in from ſpace to ſpace, along the inſide of their banks, ſtrong ſtakes of oak or alder, to ſtrengthen them, and keep them from falling in. Willows, which delight in a watery ſoil, may be advantageouſly planted upon theſe banks, which their roots will help to keep up and bind.

If a bog be ſo entirely ſurrounded with high grounds, as not to have any declivity whatever, by the help of which its waters may be drained off, ditches muſt then be dug round it, to receive the water from the neighbouring hills, and a very large pond muſt be made in the middle or loweſt part of the bog itſelf, for its waters to run into; to facilitate which, large trenches ſhould be cut from the ſurrounding ditches to this pond, and channels communicating with theſe trenches acroſs different parts of the bog. The number and ſize of which will depend on the greater or leſs wetneſs of the ground. When the water is thus collected, engines muſt be uſed to raiſe it to a proper height for a channel to carry it off. The reader will find a deſcription of ſeveral new and uſeful engines of this kind under the article, DRAINING MACHINES.

Improvement of drained BOGS. The moſt laſting and moſt perfect improvement of bogs, is effected by paring off their ſurface and burning it. *See the articles* MOOR and BURNBAKING. In order to this the bogs ſhould be levelled; and whatever earth remains unemployed in filling up hollows, ſhould be burnt together with that taken out of the ditches, unleſs the latter has been already carried off for fuel. The greater quantity of aſhes there is, the greater will be the improvement of the ſoil itſelf, and the more will the earth brought upon it be benefited. The fire on the ſurface of the moſs, exhales a very conſiderable part of the bituminous acid of this ſoil, and the fixed alkaline ſalt, always found in ſome proportion in the aſhes, corrects or neutralizes it, ſo that no inconvenience ariſes from it afterwards, if the ground be kept dry, as it ought to be. The fire ſhould not be fierce but rather ſmothered.

When the bog is pared, and the clods are collected to dry, the farmer muſt prepare earth to cover the ſurface. Marle, which is often found under bogs, preſents the beſt covering that can be deſired. If a clay lies under the bog, it muſt be prepared before it is ſpread in the manner directed under the article COMPOST, excepting only that the quantity of other ſubſtances mixed with it, ſuch as dung, &c. need not be ſo great in this caſe, becauſe the aſhes, and the bog itſelf, will greatly aſſiſt in opening the body of the clay. If a loamy earth be near at hand, it will perhaps be leſs expenſive to the farmer to bring ſuch earth to cover the bog, than it will be to dig and prepare the clay. But of whatever kind the earth be, which is laid upon the bog, the quantity ſhould always be ſufficient to cover its whole ſurface four, five, or ſix inches deep, according to the ſtiffneſs of the ſoil ſo brought. Thus four inches of clay, when mixed with the aſhes, and a due quantity of the earth of the bog itſelf, will give a depth of covering mould equal to what ſix inches of loam will do, when likewiſe mixed in proportion to its quality. If the bog be intended for arable land, the depth of the covering earth ſhould be greater; becauſe all kinds of grain, eſpecially wheat, require at leaſt a foot depth of good mould to extend their roots in, before they come to any cold or tenacious ſubſtance like peat or clay. The covering, therefore, of clay or marle ſhould be in this caſe, ſix or ſeven inches thick, and that of loam eight or nine inches.

As ſoon as the ſurface is burnt, its aſhes ſhould be ſpread and mixed with the additional covering, which will then be fit for the farmer's purpoſe, whether for corn or graſs. If the extent of the bog intended to be improved be conſiderable, it ſhould be adviſable, by means of a ſluice, to fill the ditches contiguous to the ſpot which is to be covered, and to bring the earth in barges, or flat-bottomed boats, kept on purpoſe to tranſport the neceſſary manures, and the produce of the ground. By this means a ſaving will be made of the ſurface otherwiſe neceſſary for cart-ways. Beſides, this ſoil, eſpecially, when newly trained, does not well bear heavy carriages; a circumſtance which renders it needleſs to obſerve, that broad wheels are always the moſt proper, when any muſt be uſed upon ſuch land.

The bog being covered with a proportion of earth, the husbandman must next determine to what lasting purpose he can best apply it. The too great moisture of these soils, which always lie flat, renders them unfit for continued tillage; and their mould becomes so loose, by frequent ploughing, that it does not afford sufficient stability to the roots of corn. For this reason, barley, oats, and rye, do better here than wheat, which requires a firmer footing: but neither of them should ever be sowed thick; because the fruitfulness of the soil will always make up in the size of the plants, what some might think wanting in their number. The most beneficial method of employing this sort of land is, undoubtedly, by converting it into meadow; because, when thus prepared, and not injudiciously exhausted by crops of corn, it will yield great quantities of excellent grass. It is, however, usual to begin with sowing some kind of grain on this prepared surface, to indemnify the farmer by the plentiful crop which it generally yields; such, indeed, as sometimes defrays at once the whole expence of the improvement. Perhaps the most profitable method may be, to sow it in the autumn with rape, the leaves of which, shading the surface in hot weather, and rotting in the winter, contribute greatly to mellow the earth: the strong roots of this plant open the soil; its ashes enrich it, when burnt, and its seed brings a great return when sold for making oil. One or two ploughings will then prepare it for a crop of wheat. After this is taken off, and the stubble turned down or burnt, white clover and grass-seed from upland pastures should be sowed, and the ground should then be laid down for a lasting meadow; or, if turnips are sowed, or cabbages planted, in the autumn, these, in the spring, may be succeeded by barley, with which the grass-seeds may be sowed.

When, either through necessity, for want of other arable land, or out of choice, the farmer intends to continue ploughing his improved bog, the surface must be raised in ridges, and the farther management of it may be like that of most other ploughed grounds.

If a soil of this kind happens to be situated near a town, a greater profit will accrue from planting it with garden stuff, than from any sort of grain. Beans, pease, cabbages, potatoes, turnips, carrots, &c. thrive exceeding well in such earth as this, as the marquis of Turbilly experienced to his entire satisfaction.

"I received, says he, from Strasburg, in the year 1755, some seed of the large hard cabbage, which was immediately sowed in my garden, from whence it was afterwards transplanted into a bog, which I had drained and cleared. This spot contains about an acre of ground, and forms a kind of island in my river. It had been pared and burnt; but never received any other manure than the ashes produced by that burning; no sort of dung having ever been laid upon it. The whole of it was planted with this kind of cabbage, excepting only a corner, where a few carrots, parsnips, and beet-roots all of which grew to a prodigious size, and proved exceeding good, were set out of curiosity. These cabbages throve wonderfully, several of them weighing forty pounds a-piece, were well tasted, and very wholesome, though some of the country people seemed positive that they and the other pot-herbs would be hurtful, unhealthy food, as, said they, all plants are during the first year of their growth in new drained bogs.

"These people pretended to have experienced this in other places; but not finding it so here, I ascribed the effect they talked of to some pernicious quality in the soil; for I was very sure, that the violent operation of the fire which mine had undergone, had not left any bad property in the earth. During the rest of the summer, and the autumn, some of the neighbouring peasants, whom I hired for the purpose, carried this great quantity of cabbages to the markets of three different towns, about six miles off: there they sold them; and the accounts which they gave me of their produce amounted in all to eight hundred and fifty livres, that is thirty-seven pounds, three shillings, and nine pence. The wages of these men and the expence of carriage, amounted to about half this sum; which being deducted, my acre of bog produced clear four hundred and twenty-five lives, that is, eighteen pounds eleven shillings, and ten-pence halfpenny, with which I was the better satisfied, as the cultivating of it had cost me but little. The soil, being light, was easily turned up, though fat; and I had drained off the water without difficulty, by means of a slope which happened to be properly situated. I never had been offered above a crown a year for this marshy land, which was quite a shaking-bog, and often overflowed. When drained, its surface sunk a foot lower than before. So great a produce, from so small a spot of ground, of which no one knew the goodness, shews what vast riches are hid beneath the several bogs in this kingdom. They are not, however, all like this, which chanced to be a very fertile soil. I could wish to be master of several others like it. It has since been sowed with hemp, pease, and several other plants, which have done very well, though none of its crops have have produced so much money as this first; which shews the difficulty of setting a just value upon land. All the other bogs which I have drained and cleared in different ways, have answered, in general; but no one ever yielded, in proportion, any thing like this spot." *Memoire sur les Defrichemens, pag.* 167.

BOG-*Spavin*, an encysted tumour, or according to doctor Bracken, a collection of brownish gelatinous matter, contained in a bag or cyst, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloses it forming the cyst: this case he has taken the pains to illustrate by an instance of a young colt of his own, where he observes, that when the spavin was pressed hard on the inside of the hough, there was a small tumour on the outside, which convinced him the tumour was within-side the joint: he therefore cut into it, discharged a large quantity of this gelatinous matter, dressed the sore with dossils dipped in oil of turpentine, putting into it, once in three or four days, a powder composed of calcined vitriol, alum, and bole: by this method of dressing, the bag sloughed off, and came away, and the cure was successfully completed without any visible scar.

This disorder, according to the above account, will scarcely submit to any other method, except firing, when the cyst should be penetrated to make it effectual; and in all obstinate cases that have resisted the above method, both the cure of this, and the swellings called wind-galls, should be attempted in this manner. If, from the pain attending the operation or dressings, the joint should swell and inflame, foment it twice a day, and apply a poultice over the dressings, till it is reduced. *Bartlet's Farriery, pag.* 279.

BOIL, a diſeaſe to which cattle, eſpecially ſheep, are very ſubject.

In order to cure theſe boils, it will be neceſſary to bring them to a head, by applying to them a plaſter compoſed of wheat-flour, yolks of eggs, and tar: and when they feel ſoft under the finger, to open them with a lancet, and let out the matter. Then anoint the part with ointment of tobacco, and apply over it the following plaiſter. Take of turpentine, burnt ſalt, honey, and galbanum, of each one ounce; of roſin an ounce and a quarter. Melt the whole into a ſalve over the fire. *Ellis on Sheep pag.* 101.

BOLE, the body or trunk of a tree.

Bole alſo ſignifies the ſtalk or ſtem of corn.

Bole, a meaſure of corn, containing four buſhels.

Bole *of Salt*, contains two buſhels.

BOLING-*Trees*, pollard trees, or thoſe whoſe heads and branches are cut off, and only the boles or bodies left.

BONE, a hard, brittle, inſenſible part of an animal body, affording form and ſupport to the whole machine.

All marrow-bones, fiſh-bones, hoofs, horns, or ſhavings of horn, are very uſeful in manuring lands. Bones are moſt ſerviceable when raſped or broken into ſmall pieces; becauſe their ſalts, in which their principal virtue conſiſts, are more eaſily extracted by the rains and dews, and communicated to the ſoil.

Bone-*Spavin*, a boney excreſcence, or hard ſwelling growing on the inſide of the hock of a horſe's leg.

A ſpavin that begins on the lower part of the hock, is not ſo dangerous as that which puts out higher, between the two round proceſſes of the leg-bone; and a ſpavin near the edge is not ſo bad as that which is more inward towards the middle, as it does not ſo much affect the bending of the hock. A ſpavin that comes by a kick or blow is at firſt no ſpavin, but a bruiſe on the bone or membrane that covers it; therefore not of that conſequence, as when it proceeds from a natural cauſe: and thoſe that put out on colts, and young horſes, are not ſo bad as thoſe which happen to horſes in their full ſtrength and maturity; but in very old horſes they are generally incurable.

The uſual method of treating this diſorder, is by bliſtering and firing, without any regard to the ſituation or cauſe, from whence it proceeds. Thus if a fullneſs on the fore-part of the hock comes after hard riding, or any other violence which threatens a ſpavin, ſuch coolers and repellers are proper as are recommended in ſtrains and bruiſes. Thoſe happening to colts and young horſes are generally ſuperficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by ſevere means.

There are various forms for making what is called the bliſtering ointment; but of the beſt of that kind, and what will infallibly anſwer the intention, has been already given under the article Blistering Ointment.

When a bliſter is thought neceſſary, the hair ſhould be cut as cloſe as poſſible, and then the ointment applied pretty thick over the part; this ſhould be done in the morning, and the horſe kept tied up all day without any litter till night; when he may be untied in order to lie down; and a plaiſter of pitch, or any other ſticking ſubſtance, may be laid over it, and bound on with broad tape, or a bandage, to keep all cloſe.

After the bliſter has done running, and the ſcabs begin to dry and peel off, it may be applied a ſecond time in the ſame manner as before; the ſecond application generally taking greater effect than the firſt, and in colts and young horſes makes a perfect cure.

When the ſpavin has been of long ſtanding, it will require to be renewed perhaps five or ſix times; but after the ſecond application a greater diſtance of time muſt be allowed, otherwiſe it might leave a ſcar, or cauſe a baldneſs; to prevent which, once a fortnight, or three weeks, is often enough; and it may in this manner be repeated ſix or ſeven times, without the leaſt blemiſh, and will generally be attended with ſucceſs.

But the ſpavins that put out upon older, or full aged horſes, are apt to be more obſtinate, as being ſeated more inward; and when they run among the ſinoſities of the joint, they are for the moſt part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardneſs.

The uſual method in theſe caſes is to fire directly, or to uſe the ſtrongeſt kind of cauſtic bliſters; and ſometimes to fire and lay the bliſters immediately over the part; but this way ſeldom ſucceeds farther than putting a ſtop to the growth of the ſpavin, and is apt to leave both a blemiſh and ſtiffneſs behind; beſides the great riſk run (by applications of theſe fiery and cauſtic medicines, to the nervous and tendinous parts about the joints) of exciting violent pain and anguiſh, and deſtroing the limb.

The beſt and ſafeſt way therefore is to make trial of the bliſtering ointment given under that article, and to continue it according to the directions above laid down, for ſome months, if found neceſſary; the horſe in the intervals working moderately: the hardneſs will thus be diſſolved by degrees, and wear away inſenſibly.

When the ſpavin lies deep, and runs ſo far in the hollow of the joint, that no application can reach it, neither firing nor medicines can avail, for the reaſons abovementioned: though bold ignorant pretenders have ſometimes ſucceeded in caſes of this ſort by the application of cauſtic ointments with ſublimate, which act very forcibly, enter deep, and make a large diſcharge; deſtroying by that means a great part of the ſubſtance, and diſſolve away the remainder. Though whoever is at all acquainted with the nature of ſuch medicines, muſt know how dangerous in general their operation is on theſe occaſions, and that a properly prepared cautery made like a fleam, under the direction of a ſkilful hand, may be applied with leſs danger of injuring either tendons or ligaments. After the ſubſtance of the ſwelling has been properly penetrated by the inſtrument, it muſt be kept running, by precipitate mixed with the medicine uſed in dreſſing the part, or with a mild bliſtering ointment.

Where the ſpavin lies not deep in the joint, and the bliſtering method will not ſucceed, the ſwelling may be ſafely fired with a thin iron forced pretty deep into the ſubſtance, and then the part ſhould be dreſſed as above directed. *Bartlet's Farriery, pag.* 257.

BOORCOLE. *See* Borecole.

BOOSE, a ſtall. Thus ox-booſe ſignifies an ox-ſtall, &c.

BOOT, profit, gain, advantage.

BORECOLE, *or* Boorcole, a ſpecies of cabbage, of which there are three ſorts, namely, the common borecole, the green borecole, and the Siberian borecole, which is the curled colewort, by ſome called Scotch kale. All theſe are for winter uſe, but the laſt is moſt eſteemed.

eſteemed. The two former are ſown about the middle of April, and are fit for tranſplanting in about two months after. When this is done, the plants of either of theſe ſorts ſhould be ſet a foot aſunder in rows two feet diſtant from each other. They ſhould not be eaten before the froſt has rendered them tender; for till then they are tough and bitter. The Siberian borecole, which is extremely hardy, never injured by froſt, and always ſweeter in ſevere winters than in mild ones, need not be ſown till the middle of July, and when the plants are ſtrong enough for removing, that is when they have ſix or eight leaves, they ſhould alſo be ſet in rows; the diſtance between which ſhould be about two feet, and that between the plants, ten inches. Theſe will be fit for uſe ſoon after Chriſtmas, and continue good till April. The ſoil for borecole ſhould be a good, freſh, deep-looſened earth.

Borecole has been lately found by Mr. John Wynn Baker, to be an excellent food for cattle; and the Society for the Encouragement of Arts has accordingly offered two premiums for cultivating it, one of twenty, and the other of fifteen pounds.

Mr. Baker made the experiment under the direction of the Dublin Society, who deſired him to print his account of the experiment, an abſtract of which we ſhall give the reader.

This experiment was made on a piece of ground that had been cropped the preceding year with potatoes. After he had reduced the ſoil to a pretty good tilth, and manured it with a compoſt compoſed of earth, lime, and dung, he planted three rows of borecole plants, in ridges two feet aſunder. On the 17th of Auguſt they were horſe-hoed for the firſt time, by taking off, at one furrow of the plough, only one ſide of each ridge cloſe to the plants; in which manner they remained till the twenty-fifth, when he ran the plough in the ſame furrow, by which with the firſt furrow, he ploughed about twenty-one inches deep. This being finiſhed, the earth was immediately returned back to the plants, which afforded them freſh nouriſhment; and in order to give their roots time to penetrate this freſh earth, which, by the horſe-hoeing was become very fine mould, he let them remain in this ſtate till the 12th of September, when he horſe-hoed them again, by taking off the other ſide of every ridge; and on the twentieth deepened the furrow in the ſame manner as the former, and immediately returned the mould back to the plants; and on the eighteenth threw up a ſmall furrow to each ſide of every ridge, which finiſhed the culture, and reſtored the ridges to the form they were in when the borecole was planted.

"On the 18th of December, continues Mr. Baker, I cut two perches in length of one of the rows of borecole, which contained twenty-one plants; they weighed one hundred and eighteen pounds, which is very near five pounds ten ounces for each plant: but I am inclined to believe that theſe plants will ſucceed as well, if they are planted only eighteen inches aſunder in the rows. However, at the above proportion, there would be ſeventeen tons, and fourteen hundred upon an acre. But, if the produce would be the ſame, were the plants only eighteen inches aſunder, in that caſe, an acre would produce, by this culture, above twenty-three tons, and twelve hundred.

"This plant is worthy the farmer's or grazier's attention, for, as faſt as it is cut, it will again, in about a month or ſix weeks, afford another crop: I have been cutting theſe plants for my family uſe, ever ſince the middle of Auguſt laſt; I believe ſome of them have been cutting three times, and they are excellent for the table. For feeding cattle and ſheep they are highly valuable, as no froſt will injure them; and although the firſt crop amounts not to as many pounds upon any given quantity of ground as thoſe of cabbage or the turnip cabbage, yet the ſucceeding crops will, I believe, make their produce nearly, or quite, of equal weight with any other of the cabbage kind. But I muſt not omit to obſerve, that, as theſe plants afford only open leaves, and many of them very ſmall, there will be a little more trouble in collecting and carrying them to the ſheep and cattle, than there will be with the other kinds.

"It may not be improper to obſerve likewiſe, that, upon the approach of ſpring, when they begin to throw out their ſpring ſhoots for ſeeds, if the large leaves have not been taken off for winter uſe, they will decay and fall off.

"I have not yet tried it; but I believe the beſt way of uſing this plant, would be to allot one whole field to the culture of it proportioned in ſize to the ſtock intended to conſume the produce; and in September or October, to turn the ewes into the field for a few hours, morning and evening, and then to lodge them on any piece of graſs or fallow, which may want improvement, to which they will greatly contribute by emptying themſelves upon it; and thus continue to turn them into the borecole-field, till they have eat all the luxuriant leaves; then let the plants reſt a month, and there will be another crop. By having two ſmall fields under this crop, a flock of ſtore ſheep might be maintained a whole winter at a very ſmall expence; for while the produce of one field would be conſuming, the other would be coming on.

"This method occured to me from an accident which attended my borecole this year. My cows got into the field, and preſently devoured ſome of the leaves of the plants; theſe plants have engaged my attention ever ſince, and I have the pleaſure of ſeeing them again in a very luxuriant ſtate.

"If any perſons ſhould be able to put this ſcheme in practice, before I can accompliſh it, I recommend it to them not to let the ſheep paſture ſo long on the crop, as to injure the ſtalks for want of leaves; as too great an injury to the ſtalks may check the ſucceeding growth; which injury, I am inclined to believe, will not happen to the plants, at leaſt not in ſo great a degree, whilſt they have a ſufficient quantity of leaves.

"It will doubtleſs be obſerved, that I confine this ſcheme to ewes or ſtore-ſheep: my reaſon for that is, that fat ſheep ſhould always have as much food before them, as they chooſe to eat; add to this that ſheep when they are fat, are more ſubject to be lame than ſtore-ſheep, to which ploughed ground will greatly contribute."

BORD-*Lands*, the demeſnes which lords keep in their own hands, for the maintenance of their board or table.

BORD *Service*, the tenure of bord-lands, by which the tenants were to provide proviſions for their lords tables. There is ſtill ſome remains of this tenure remaining; but the tenants pay only a ſmall rent per acre, inſtead of finding the proviſions formerly required.

BORER, or *Screw-borer*, an inſtrument invented by the marquis of Turbilly, for ſearching or exploring the nature of any ſoil.

This borer is compoſed of two rods of iron, Plate I. Fig. 6 and 7. each ſix feet long, and an inch in diameter. The end A, of fig. 6. ſcrews into the end B, of Fig. 7, after taking out the ſtopper C, the uſe of which is to hinder either dirt or duſt from getting into the ſcrew. The ſcrew is an inch and a half long, and three quarters of an inch in diameter. D, Fig. 6, is a ſteel point ſomewhat blunt to pierce the earth, or any ſubſtance it may meet with. It ſhould be about three inches long, and made with either three, four, or more ſides, as may be thought moſt convenient. It is ſcrewed into the rod A in the ſame manner, and with a ſcrew of the ſame ſize as A is ſcrewed into the rod B. It is a groove ſix inches long, a third of an inch wide, and three quarters of an inch deep, rounded in the bottom, and intended to bring up part of each different layer through which it paſſes. When ſprings are ſought for, a bit of ſponge is put into the groove. At the end F, of the rod, Fig. 7, is a ſcrew to fix into another rod of the ſame kind, if it be found neceſſary to lengthen the inſtrument; and this may be repeated by the addition of more rods, to any depth deſired. G H, Fig. 6, is the handle of this inſtrumen', two feet and a half long. This handle is faſtened to the rod by means of a claſp I, lined with ſteel, fixed at one end by a hinge, and at the other by the ſcrew L; ſo that it may be placed at any height. Fig. 8 is the handle ſeparated from the rod, and marked with the ſame letters as before. Fig. 9, marked with the ſame letters as before, is another handle, or rather lever, like the handle already deſcribed, except its having only one branch or lever marked G. This ſerves to ſtop the borer when we are bringing it up from a conſiderable depth, and alſo to ſcrew and unſcrew the ſeveral bars, or joints, as occaſion requires: and to put on, or take off the ſteel point at the bottom. The handle G A, Fg. 6, is that by which the rod is held, and worked into the earth, either by twiſting it round, eſpecially at firſt, or after it has penetrated to the ſame depth, by lifting it up, and letting it fall again, which it does with ſuch force as to pierce even the hardeſt rocks; eſpecially if it works at any conſiderable depth, and has of courſe been lengthened accordingly; for every foot of this rod weighs three pounds. Two men will eaſily ſound the depth of twelve feet in leſs than a quarter of an hour, if they do not meet with many ſtones. When the rod becomes too heavy to be properly managed by hand, it may be raiſed by a rope faſtened at one end to the handle, and at the other to a roller, or kind of windlaſs, erected at a proper height, perpendicularly over the hole, and turned with either one or both handles. This will coſt but a trifle, and will eaſily raiſe the other rod, which, when let go, will fall with ſuch weight, as to ſtrike each time very deep into the earth. The marquis tells us, that he has ſeen it worked in this manner to the depth of more than an hundred feet.

The tougheſt iron is the beſt for making this inſtrument, which ſhould be well hammered, till its ſurface be quite ſmooth and even: for the leaſt roughneſs and nequality would occaſion a friction, which would greatly etard its working. For the ſame reaſon, and alſo to ncreaſe the force of its fall, it is neceſſary that it ſhould e perfectly ſtrait: nor ſhould it ever be ſtruck with a mallet, hammer, &c. to force it down; becauſe a blow might bend it, and it would eaſily break afterwards. The female ſcrew muſt be turned like that in the breech of a gun barrel, in a ſeparate piece of iron, croſs-ways to the grain, and this piece muſt be afterwards well ſoldered on to one of the ends of the rod. The reaſon for this is, that if the female ſcrew were bored only at the end of the rod, it would, by being hammered out in the ſame direction with the grain, be ſtringy and porous, and conſequently ſo weak as to give way, or burſt, in the working of the rod; whereas when made of a ſeparate piece, taken croſs-ways of the grain, the threads of the ſcrew will run with the grain of the iron, and be thence conſiderably ſtrengthened. A bit, like that of an augre, proportioned to the thickneſs of the rod, may at any time be ſubſtituted inſtead of the ſteel point, to draw up a ſample of the ſubſtance from the very bottom of the ſounding.

If the only thing wanted be to know the nature of the under ſoil, and layers of earth, ſo far as they may effect the vegetation of plants, it will be very ſufficient to bore eight or ten feet deep. A greater depth is only requiſite when water, marl, ore, &c. be ſought for.

The common augre indeed will do very well for ſhallow boring, as we have already obſerved under that article. *See the article* AUGRE.

By either of theſe inſtruments, there is a certainty of diſcovering, without much charge, or any hazard, not only what earths are under the upper ſoil, but alſo whether any other ſubſtance of value lies concealed there, ſuch as marle, chalk, fuller's-earth, foſſile ſhells, coals, quarries of ſlate or ſtone, ores, &c. many of which are hid, and intirely unthought of in places, where their value, was it known, is ten times more than that of the eſtate which covers them.

BORING, an operation ſometimes practiſed for the cure of horſes, whoſe ſhoulders are wrenched.

The operation is performed in the following manner: they cut a hole in the ſkin in the middle of the ſhoulder, and with the ſhank of a tobacco-pipe, blow it as a butcher does a ſhoulder of veal; then they run a cold flat iron, like a horſeman's ſword-blade, eight or ten inches up between the ſhoulder blade and the ribs, which they call boring; after that, they burn him round the ſhoulder with a hot iron. *Burd. Gent. Far.*

This is a very abſurd and cruel treatment, and can be of no manner of ſervice. *Bartlet's Farriery.*

BOSTAL, a way up a hill.

BOTTS, a name given to a ſpecies of worms infeſting horſes and other cattle.

The botts which grow in the ſtomach of horſes, and which are ſometimes the cauſe of convulſions, appear to be very large maggots, compoſed of circular rings, with little ſharp prickly feet along the ſides of their bellies (like the feet of hog-lice) which, by their ſharpneſs, equal to that of the fineſt needle, ſeem to be of uſe to faſten them to the part where they breed, and from whence they draw their nouriſhment, and alſo to prevent their being looſened from ſuch adheſion, before they come to maturity. The eggs from whence theſe botts are produced, are diſpoſed in cluſters round the lower orifice of the ſtomach, and are layed under the inner coat, or thin membrane of the ſtomach; ſo that when the animals come to life, they burſt through this inner coat,

their breech and tail ſtrait outwards, and their trunks ſo fixed into the muſcular or fleſhy coat of the ſtomach, that it ſometimes requires a good pull to diſengage them: from the blood of this laſt coat they draw their nouriſhment, which they ſuck like ſo many leeches, every one ulcerating and purſing up the part where it fixes, like a honey-comb; and they often make ſuch quick havock as to deſtroy the horſe.

The botts which many horſes are troubled with in the beginning of the ſummer, are always ſeen ſticking to the ſtrait gut, and are often thruſt out with the dung, together with a yellowiſh coloured matter reſembling melted ſulphur; they are no ways dangerous there, but are apt to make a horſe reſtleſs and uneaſy, and rub his breech againſt the poſts. The ſeaſon of their coming is in the months of May and June, after which they are ſeldom to be ſeen, and rarely continue in any one horſe above a fortnight or three weeks. And the creature may be eaſily cured when they are only in the ſtrait gut, by giving him a ſpoonful of ſavin cut very ſmall, once or twice a day in his oats, or bran, moiſtened: three or four cloves of garlick may alſo be added to advantage. The following purge ſhould likewiſe be given:

Take fine ſuccotrine aloes ten drams; freſh jallap one dram: birthwort and myrrh powdered, of each two drams; oil of ſavin and amber, of each one dram; ſyrup of buckthorn enough to form the whole into a ball.

But the botts, which take their lodgment in the ſtomach, are, as has been already obſerved, extremely dangerous, by cauſing convulſions, and are ſeldom diſcovered by any previous ſigns before they come to life, when they throw the horſe into violent agonies. The only cure for theſe is mercurial medicines; the following will anſwer the intention:

Take quickſilver two drams; Venice turpentine half an ounce; rub the quickſilver till no gliſtening appears; then take an ounce of aloes, a dram of grated ginger, thirty drops of oil of ſavin, and ſyrup of buckthorn enough to make the whole into a ball.

One of theſe balls may be given every ſix days, with the uſual precautions with regard to mercurial phyſic: and the following powders immediately:

Take powdered tin and Æthiops mineral, of each an ounce; and give it every night in a maſh, or in his corn.

Theſe medicines, or any of the various preparations of antimony and mercury, ſhould be continued ſeveral weeks together, in order to free the animal entirely from theſe vermin. *Bartlet's Farriery, p.* 150.

BOUDS, a name in ſome countries for the inſects generally called weevils, breeding in malt.

BOW, a name in ſome countries for a yoke.

BOWS *of a ſaddle*, are two pieces of wood laid archwiſe to receive the upper part of the horſe's back, to give the ſaddle its due form, and keep it ſteady.

BOX, the name of a well known tree, of which botaniſts enumerate ſeven ſpecies viz. 1. The box-tree. 2. The narrow leaved box-tree. 3. The ſtriped box. 4. The gold-edged box-tree. 5. The dwarf box. 6. The dwarf ſtriped box. 7. The ſilver edged box.

The firſt and ſecond ſorts grow in great plenty upon Box-hill near Dorking in Surry, where were formerly large trees of theſe kinds: but of late they have been pretty much deſtroyed; yet there are great numbers of theſe trees remaining, which are of a conſiderable bigneſs. The wood of this tree is very uſeful for turners, engravers, and mathematical inſtrument makers; the wood being ſo hard, cloſe, and ponderous, as to ſink in water; which renders it very valuable for divers utenſils.

All the varieties of the trees, or large box, are proper to intermix in clumps of ever-greens, &c. where they add to the variety of ſuch plantations: theſe may be propagated by planting the cuttings in autumn in a ſhady border, obſerving to keep them watered until they have taken root; when they may be tranſplanted into nurſeries, till they are fit for the purpoſes intended. The beſt ſeaſon for removing theſe trees is in October; though, indeed, if care be uſed to take them up with a good ball of earth, they may be tranſplanted almoſt at any time, except in the ſummer: theſe trees are a very great ornament to cold and barren ſoils, where few other things will grow; they may alſo be propagated by laying down the branches, or from ſeeds: the laſt being the beſt method to have them grow to be large, the ſeeds muſt be ſown ſoon after they are ripe, in a ſhady border, which muſt be duly watered in dry weather. *Miller's Gard. Dict.*

BOX *of a wheel*, the aperture wherein the axis turns.

BOX *of a plough*, the croſs-piece in the head of a plough which ſupports the two crow-ſtaves. *See* PLOUGH.

BRACE, a general name for a couple, or pair of any thing, as bucks, hounds, partridges, &c.

BRACE alſo ſignifies a piece of timber framed into the beams, &c. with bevel joints, to keep the building from ſwagging either way.

BRACKEN, the ſame with brakes, or fern. *See the article* FERN.

BRACKET, or BRAKET, a ſort of compound drink, made with honey, ſpices, &c.

BRAKE, the ſame with fern. *See the article* FERN. It is likewiſe applied to the place where fern grows.

BRAKE, is alſo a name given to an inſtrument often uſed by farriers, &c. generally called barnacles. *See* BARNACLES.

BRAKE *of a pump*, ſignifies the handle wherewith it is wrought.

BRAKE, is likewiſe the name of a wooden-toothed inſtrument, uſed to bruiſe and break the bun of hemp, and ſeparate it from the rind. *See the article* HEMP.

BRAN, the ſkin or huſks of corn, eſpecially wheat, ground and ſeparated from the flour by means of a ſearce or boulter.

Bran is a uſeful ingredient in a horſe's diet, if diſcretely uſed, and when ſcalded is a kind of panada for ſick horſes. But nothing is worſe than a continual uſe of bran raw or ſcalded, as it is apt to weaken a horſe's bowels, and thereby expoſe them to many diſorders. *Gibſon on the Diſeaſes of Horſes, vol.* I. *pag.* 172.

Mr. Mills aſſures us, that a little wheat bran boiled in our ordinary beer, will make it mantle in the cup. *Huſbandry, vol.* I. *pag.* 407.

BRANCH, an arm of a tree, or a part which ſprouting

ing from the trunk, helps to form the head or crown.

BRANK, the ſame with buckwheat. *See the article* BUCKWHEAT.

BRANT, a ſteep, riſing with a conſiderable inclination.

BRAWN, the fleſh of a boar, boned, rolled up, or collared, boiled, and laſtly pickled.

Brawn is made only of the flitches, without the legs: the oldeſt boars are choſen for this uſe, it being a rule, that the older the boar the more horny the brawn.

The method of making it is as follows: the bones being taken out of the flitches, the fleſh is ſprinkled with ſalt, and laid in a tray, that the blood may drain off; after which it is ſalted a little, and rolled up as hard as poſſible. The length of the collar of brawn ſhould be as much as one ſide of the bone will bear; ſo that when rolled up, it may be nine or ten inches in diameter.

The collar being thus rolled up, it is boiled in a copper or large kettle, till it is ſo tender that you may run a ſtraw through it: when it is ſet by till throughly cold, and then put into the following pickle. To every gallon of water add two handfuls of ſalt, and as much wheat-bran; boil them together, drain the liquor as clear as poſſible from the bran, and when the liquor is quite cold, put the brawn into it.

BREAD, a well-known food chiefly divided into white, wheaten, and houſhold; differing only in degrees of purity. In the firſt, all the bran is ſeparated; in the ſecond only the coarſer; in the third, none at all; ſo that fine bread is made only of flour; wheaten bread of flour, with a mixture of fine bran; and houſhold, of the whole ſubſtance of the grain, without taking out either the coarſe bran, or fine flour.

We alſo meet with ſymnel bread, manchet or roll bread, and French bread: which are only ſo many denominations of the fineſt or whiteſt bread, made of the pureſt flour; except that in roll bread there is an addition of milk, and, in French bread, of eggs and butter alſo. To which may be added, ginger-bread, made of white bread, with almonds, liquorice, aniſeed, roſe-water, and ſugar; and maſlin-bread, made of wheat and rye, or ſometimes of wheat and barley.

The proceſs of making houſhold bread amongſt us, is thus; to a peck of meal they add a handful of ſalt, a pint of yeaſt, and three quarts of water, cold in ſummer, hot in winter, and temperate between the two; the whole, being kneaded in a bowl or trough by the fire in winter, from it in ſummer, and a little yeaſt added, will riſe in about an hour; they then mould it into loaves, and put it into the oven to bake. *Hought. Collect.*

For leavened bread, part of the flour intended for it, being made into dough with warm water and a little ſalt, is laid in the reſt of the flour an hour or more, in which time it riſes to three times the bulk; then they mix and knead the whole with more water, till it be brought into a ſtiff dough; which, being formed into loaves, is baked in the oven: though the more uſual way is to take a piece of dough kneaded, and leave it in the tub till next time, when they break it ſmall, and mix it with the meal, adding ſome yeaſt. *Hought. Collect.*

For French bread, they take half a buſhel of fine flour, ten eggs, and a pound and a half of freſh butter, into which they put as much yeaſt, with manchet; and, tempering the whole maſs with new milk, pretty hot, let it lie half an hour to riſe; which done, they make it into loaves or rolls, and waſh it over with an egg beaten with milk; care is taken the oven be not too hot. *Ruſt. Dict.*

BREAK, land ploughed the firſt time after it has lain fallow in ſheep walks.

BREAST-PLOUGH, a ſmall plow contrived ſo that a man may ſhove it before him. It conſiſts of a cutting iron about eight or nine inches long, and having one of its ſides turned up to cut the turf. This iron is fixed to a pole bending upward about five or ſix feet long, and forked at the upper-end, having a crutch, or croſs handle, mortiſed into the forks. Againſt this crutch the ploughman places his breaſt, and ſhoves along the plough, in order to turn up the turf, its only uſe being for cutting up the ſurface of the ground in the operation called burn-baking. *See the article* BURN-BAKING.

BRECK, *or* BRACK, a breach or gap made in a hedge.

BREW-HOUSE, a houſe erected for the purpoſes of brewing.

The conveniency of water is one of the firſt things to be attended to in erecting a brew-houſe, becauſe the frequent carriage of that neceſſary fluid greatly enchances the coſt of the beer. The water ſhould be ſoft, and if ſupplied from an adjacent river, it ſhould be conveyed by a paſſage under-ground, in order to its being pumped up from thence into the copper, or into troughs properly placed for carrying it where it may be wanted. If there be a reſervoir for rain-water, it ſhould be made as near the brew-houſe as poſſible.

The quality of the water made uſe of, is a principal conſideration in brewing: and to this, in a great meaſure, ſeems to be owing the ſuperiority of the beer of ſome particular places. Ramſbury, in Wiltſhire, is noted for good beer, which induced a brewer in a neighbouring county to endeavour to imitate it; and being of opinion that the goodneſs of the Ramſbury beer, was chiefly from a ſuperior quality in the malt brewed there, he bought ſome of the beſt malt to be had there, but found upon trial, that the beer brewed from it, was no better than what he uſed to brew from other good malt. He then bought ſome more malt at Ramſbury, and engaged a brewer from thence, to brew this malt for him; but, without ſucceſs; this ſecond brewing of the Ramſbury malt was no better than the firſt: which induced him to conclude, that the ſuperior quality of the Ramſbury beer conſiſted principally in their water; which is ſoftened by the chalk, waſhed down from the higher grounds there, by rain. In confirmation of which, it is obſervable, that a brewer in Ramſbury, removed ſome years ago to Whitchurch in Oxfordſhire, where he continued to brew beer, and the ſoil in that neighbourhood, being alſo chalky, his beer ſo much reſembled the Ramſbury beer, that he ſent quantities of it to London, and ſold it there as ſuch.

Water for brewing is ſoftened, not only by chalk, but by other calcarious ſubſtances, which maybe obtained in many places at proper ſeaſons. The late Mr. Owen, who kept the Rummer at Charing-Croſs, London, was noted for the goodneſs of his beer, which he had from Mr. Gyfford's brew-houſe. The reaſon he aſſigned for his beer being ſo good was, that he laid in his ſtock of beer in the month of November immediately after hard rains, that flooded the river, and made the water muddy;

muddy; his beer was then brewed, and as ſoon as it was in fit order, was all put into his cellars at Charing croſs, where he attended its fermentation himſelf; and declared he knew no other reaſon for the good quality of his beer, but the quality of the water, thus ſoftened by the particles of the ſoil, waſhed into the river by the firſt heavy rains that fell in the beginning of winter; a circumſtance worthy of the notice of thoſe who are deſirous to have very good beer, which their attending to this circumſtance may be a means of obtaining, without any additional expence.

The brew-houſe ſhould be ſo ſituated as to face the north, for ſhade and coolneſs. It ſhould be as near as poſſible to the cellar, that the labour and expence attending the carriage of the liquor may be ſaved, and the danger of expoſing it to either too hot, or too cool an air prevented. The floor ſhould be paved with ſtone or hard bricks, and raiſed in the middle, to give an eaſy diſcharge to the water, ſo a to keep the brew-houſe always clean.

The copper ſhould be proportioned to the quantity brewed, and ſhould be raiſed ſo high that the water may run from it to the maſh-tub, and the wort to the coolers. For this purpoſe there ſhould be either a cock in the ſide at the bottom of the copper, or a braſs pump ſhould be fixed to its ſide, by means of which the water or wort may be conveyed through a trough to their proper receptacles.

The maſh-tub ſhould be round, not too deep, and perfectly ſmooth on the inſide. It ſhould have a falſe bottom, which may ſerve as a ſtrainer, when by turning a cock placed below, the wort may be drawn off into the receiver: or the wort may be let out by means of an upright plug ſurrounded with a baſket-ſtrainer.

The receiver ſhould be lined with milled lead, which is eaſily kept perfectly clean, and is not apt to contract any bad taſte or ſcent, as wood is known to do, notwithſtanding the greateſt care. The beſt method of conveying the wort from the receiver to the copper is by means of a hand-pump.

There ſhould be two coolers, or backs, as the brewers call them. Theſe ſhould alſo be lined with milled lead, or made of the heart of oak rendered perfectly ſmooth; and placed as near as convenient to the copper.

The working veſſel or tun ſhould be placed at ſome ſmall diſtance from the cooler. It ſhould be round, but not lined with lead; becauſe this would cool the liquor too much in cold weather during the fermentation.

The cellar ſhould, as already obſerved, be near, if poſſible, and ſunk much lower than the working-tun, that the beer may be conveyed into the caſks by a cock and hoſe, or ſome other eaſy method.

There muſt be in the brew-houſe an oar to ſtir the malt in the maſh-tub, with bowls, pails, and other utenſils, neceſſary in different operations. Theſe, as well as every other implement employed in brewing, ſhould be boiled in the copper, or well ſcalded every time before they are uſed.

Too great care cannot be taken to keep every veſſel perfectly clean and ſweet; for if they are the leaſt tainted, the liquor will contract a diſagreeable ſcent. When any taint is ſuſpected, the veſſels ſhould be well waſhed with a ſtrong leye of clean wood-aſhes. This leye ſhould be put into them ſcalding hot, and every joint, crevice, and ſmalleſt hollow muſt be well ſcrubbed. If there are no aſhes to be had, lime may be ſlaked in water in the veſſels; and if this be done in caſks, they may be bunged up as ſoon as the ebullition is over, and not opened till three days after. The more effectually to prevent the lodging of any kind of filth, the ſides of every veſſel ſhould be as ſmooth as poſſible; and after every brewing, they ſhould be waſhed with boiling water, and laid up dry.

BREWING, the operation of preparing beer, or ale, from malt and hops.

The uſual proceſs of brewing is as follows: the ingredients being ready, the water muſt be made to boil very ſpeedily, and while boiling with the greateſt violence, the fire muſt be immediately damped, or put out; when the height of the ſteam is over, the water is put into the maſhing-but, to wet the malt; then ſo much being poured out, as to make it of a conſiſtence ſtiff enough to be rowed up, let it ſtand thus a quarter of an hour, after which another quantity of water is added, and rowed up as before; at laſt the full quantity of the water is poured upon it, and that in proportion as the liquor is intended to be ſtrong or weak: this part of the operation is called maſhing. Afterwards the whole may be left to ſtand two or three hours, more or leſs, according to the ſtrength of the wort, or the difference of the weather; then let it run into the receiver, and maſh again for a ſecond wort in the ſame manner as for the firſt, only the water muſt be cooler, and muſt not ſtand above half the time.

The two worts being mixed together, the quantity of hops that is deſigned may be added thereto, and the liquor put into the copper, which being cloſely covered up, let boil gently for the ſpace of an hour or two; then let the liquor into the receiver, and the hops ſtrained from it into the coolers.

When cool, the barm is applied; which done, it is left to work, or ferment, till it be fit to tun up.

For ſmall-beer there muſt be a third maſhing; the water muſt be near cold, and to ſtand not about three quarters of an hour; to be hopped and boiled at diſcretion.

Such is the proceſs, as commonly delivered, for brewing; but it is in many particulars ſo vague and uncertain, that proper explanations will be requiſite.

The malt is ordered to be put into the maſh-tub, when the height of the ſteam is over: but how is this to be known exactly? Some direct you to ſtay till you can ſee your face in the water, which is full as equivocal. Perhaps the method propoſed by Dr. Shaw might anſwer the purpoſe. He directs us to put a certain meaſured quantity of cold water to the malt firſt, and ſtir that very well with it, ſo as to form a kind of thin uniform paſte; after which the remaining quantity of the water may be added in a ſtate of boiling, without the leaſt danger. By this means, adds that able chemiſt, the proper or preciſe degree of heat, neceſſary to extract the virtue of the malt with all advantages, may be very expeditiouſly hit, or aſſigned, to a great exactneſs; as the heat of boiling water is a ſtandard, which may at once be let down to any deſired point of warmth, by a proper addition of cold water; due allowance being made for the ſeaſon of the year, and the temperature of the air.

To employ only one copper in brewing is generally allowed to be bad management; becauſe the buſineſs muſt, in that caſe, ſtand ſtill in ſome part or the other, however

however well the proceſs may be contrived. For this reaſon, the beſt and more uſual method is to brew with two coppers.

The great copper in which the water for the two firſt extracts receive their temperature, is built very near the maſh-tub, ſo that the water may be readily conveyed to the ground malt. At the bottom of the copper is fixed a cock, which being turned, lets the water run through a pipe to the real bottom of the maſh-tub. This is by far the beſt way, becauſe this is the moſt expeditious, and leaſt liable to accidents.

When the water has been brought to a proper degree of heat in the maſh-tub, the malt is run very leiſurely into it, whilſt another perſon ſtirs it all the time, ſo as to mix the whole of it uniformly with the water, and prevent any its parts from gathering into clods. In this operation rakes ſhould be firſt employed; becauſe by their horizontal motion, leſs violent than that of maſhing, the fineſt parts of the malt are well wetted, without its flour being ſcattered or loſt in the air: but as a ſtill more perfect penetration and mixture are neceſſary, oars are afterwards uſed, by which a thorough inhibition of the water is effected. When the maſh has been ſufficiently ſtirred, it is covered with a ſprinkling of malt, and the tub itſelf ſhould alſo be covered with ſacks or other cloths to keep it warm.

After maſhing, the malt and water are left untouched for an hour an a half, or two hours; and during this interval, the large copper of water is brought to a proper heat for a ſecond maſhing. The ſecond extract is commonly maſhed three quarters of an hour, and is afterwards let ſtand the ſame ſpace of time; and the third requires half an hour, both for maſhing and ſtanding. As the firſt drawn wort is immediately put into the large copper, the water for the third maſhing is boiled in the ſmaller.

Small quantities of malt brewed in large veſſels loſe their heat ſooneſt by lying thin and greatly expoſed to the action of the air; and, on the contrary, a leſs allowance for the loſs of heat is required for large quantities brewed in proportionable veſſels. This is the only difference between brewing carried on in large brew-houſes, and thoſe which are made in private families. Care ſhould be taken that the quantity of malt be not ſo large as to exceed the bounds of one man's labour; nor ſo ſmall as to prevent the heat being uniformly maintained. It is alſo of great importance never to let the malt remain with leſs water than will cover it.

It is the general cuſtom in private families to brew their ſmall-beer after their ale: but they may be aſſured that if they have any regard to their ſmall-beer, it is their intereſt to brew it alone; for the beer thus made is incomparably better, becauſe it then contains all the flavour of the malt, is undoubtedly more wholeſome, and will keep much longer.

A correſpondent of the editors of the *Muſeum Ruſticum*, *vol.* vi. *pag.* 287, has given the following uſeful directions for making a kind of ſmall beer, which for cheapneſs, agreeableneſs, and perhaps wholeſomeneſs, is greatly preferable to that made from malt. It has alſo this further advantage, that it may be made ready for drinking in three or four days time.

The method is this: take of water fifteen gallons; and boil one half of it in any copper or pot that may be at hand. Put the part of the water thus boiled, while in its full heat, to the cold part contained in a barrel or caſk: and then add one gallon of melaſſes, commonly called treacle, ſtirring them well together. If the veſſel be new, add a little yeaſt; but if it has been uſed before for the ſame purpoſe, the yeaſt will be unneceſſary. Keep the bung-hole open for a day or two, till the fermentation appears to be abated, and then cloſe it up. The beer will in a day or two afterwards be fit to drink.

But to return to the management of the wort. The beer-wort muſt be boiled, in order to free it from particles which would render the liquor muddy and ill coloured, without adding to its ſtrength; to extract the virtue of the hops; and to render the drink fitter for keeping.

Worts, like every other ſweet vegetable juice, when once brought to ferment, are ſo inclined to continue their fermentation, that it is difficult to retard their progreſs therein, to keep their preſervative qualities, and ſo hinder them from turning acid. Among the many methods put in practice to retard this forwardneſs of the worts, none promiſed ſo much ſucceſs as blending with them the juice of ſuch vegetables as are not of themſelves eaſily fermented. Hops are ſelected for this purpoſe; and experience, which has proved their wholeſomeneſs, has alſo demonſtrated their efficacy: for their reſinous parts retard the aptneſs of malt liquors to ferment. By this means they keep malt-liquors ſound a longer time, and by repeated and ſlow frettings, give an opportunity to the particles of the liquor to be more ſeparated and comminuted, than they would otherwiſe be. Fermented liquors acquire hereby a greater pungency, ſo that, even if they did not receive an additional ſtrength from this ingredient, hops would be the means of improving their taſte.

The aromatic parts of hops are volatile, and a ſmall heat diſengages them from the plant. To preſerve theſe parts of the proceſs of brewing, the hops ſhould be put into the copper as ſoon as poſſible, and be thoroughly heated while the heat of the wort is at the leaſt, and the fire under the copper has no effect there. Whoever will take the trouble of ſeeing this performed, will be convinced that the flavour of the hops is retained; inſtead of being diſſipated in the air, as it always is, when the wort is firſt ſuffered to boil.

In order to extract more gradually a fragant tincture from the hops, they ſhould be rubbed thoroughly between the hands, and then put into a bag or fine net, ſo looſe that the wort may be eaſily admitted among them, and in this ſtate they ſhould be placed in the receiver or under-back, ſo that the wort may run upon them. After this gradual ſoaking, during which they will communicate much of their virtue to the wort, leſs boiling will ſerve, and the beer will have their full flavour.

A correſpondent of the editors of the *Muſeum Ruſticum*, *vol.* III. *p*, 64, has made ſome judicious remarks on the common practice of boiling the hops in the wort. He obſerves that the rich, fat wort, ſheaths up the pores of the hop, and, as it were, embalms the leaves, ſo that the beer or ale-wort can extract a very ſmall part only of the neceſſary quality of the hop: but when it is put into the ſmall beer, a fluid of a thinner nature, the pores are unſheathed; ſo that the latter becomes too bitter, while the former has hardly any taſte of the hop.

To

To remove these inconveniencies, he proposes to soak the hops previously in a pail or two of hot water, by which means the hop will impart its good qualities impartially, and both the strong and small beer obtain a grateful bitter. And with regard to the quantity of water used in soaking the hops, allowance may be made for it in the first quantity.

When the first wort is sufficiently boiled, it is conveyed into the coolers; and if the hops are not contained in a net, it must be run though a sieve or strainer, to keep them back. If the coolers have not been perfectly cleaned from the sediment of former worts, which is very apt to insinuate itself into old or decayed wood, the wort intended to be cooled in them, will, before it is removed, contract from that sediment a degree of fermentation. This accident generally happens in a little more than twelve hours after the putting in of the wort: and therefore may be easily prevented by not letting the wort continue so long in the coolers.

When the wort is of a proper degree of coolness, the yeast is generally put into a large bowl, and a little of the wort just warm is added to it. The yeast swims at first on the surface, but soon blends itself with the wort, and begins the fermentation. As soon as this happens, the whole is mixed with the wort in the working tun.

If the fermentation should not rise properly, a little of the finest wheat flour sifted over the wort, so as to cover the whole surface of the liquor, will, by forming a kind of artificial head, confine the air, and soon produce the effect desired. If a greater degree of warmth should be wanted, a stone jug filled with boiling water, and put into the wort, will communicate a gentle heat to the whole, and as the liquor warms, the fermentation will come on in a gradual and proper manner.

In the course of the fermentation, it may sometimes be necessary, in order to quicken it, to beat in the yeast, or rather to stir it with a wisk, which should be perfectly clean, scalded in boiling water, and then wiped dry. It will also by this means retain some degree of warmth, which will likewise help to promote the fermentation. These measures, with an additional warmth given to the air, and warm coverings laid over the working tun, seldom fail to answer the end desired.

If the fermentation proceeds too violently, owing to the warmth of the weather, or too great quantity of yeast, the best way of checking it is, to cool the air, by giving it a more free admission, and to mix a little cold wort with the fermenting liquor. The practice of adding some unctuous substance is bad, and therefore should be rejected.

Care should be taken to have the casks in good order against the time that the fermentation is completed in the tub; that is, they should be tight and clean, and perfectly free from filth or smell; for if they have either of these defects, the whole labour will be lost, because the excellency and fine flavour of the liquor will be destroyed.

The perfection of malt liquors depends not only on the proportion of the oils to the salts, and on the proportion of hops used in brewing, but also on the fermentation's being carried on slowly and cooly. For this reason cool weather is best for brewing of beer intended for long keeping. If therefore the liquor be not drawn off before the fermentation has proceeded too far, some of the coarser oils will return into the liquor, and give it a disagreeable and greasy taste. On the contrary, if the fermentation has not been continued its due time, the impurities which would either have sunk down in the lees, or have been thrown up with the head, will remain in the liquor, and prevent its becoming clear and well tasted.

When the fermentation is at its height, all the dirt or foul yeast, which rises on the surface, must be carefully skimmed off.

When the fermentation begins to subside after the liquor has been drawn off into the cask, the cask should be filled up with a reserve of the same liquor taken from another vessel, but by no means with that which runs over.

When the fermentation has ceased, the cask being filled up, should be bunged close down, leaving the vent-hole open, or but slightly covered, till all motion in the liquor is subsided; and after this is over, the vent-hole should be stopped quite close. The custom of using bungs made of cork is wrong. A wooden bung should be fitted to the bung-hole as exactly as possible, and covered with a clean cloth.

BRIDLE, a contrivance made of straps or thongs of leather, and pieces of iron, in order to keep a horse in subjection and obedience.

The several parts of a bridle are, the bit or snaffle, the head-stall, or leather from the top of the head to the rings of the bit; the fillet, over the forehead and under the fore-top; the throat-band, which buckles from the head-band under the throat; the nose-bands, going through the loops at the back of the head-stall, and buckled under the cheeks; the rains or long thongs of leather that come from the rings of the bit, and being cast over the horse's head, the rider holds in his hand.

BRIDLE-*Hand*, is the horseman's left-hand, the right being called the spear or sword hand.

BRIM, *or* BRIMME, a word applied to a sow when she goes to the boar, which is called going to brim.

BRINE, pickle, or water replete with saline particles.

BRINING *of Hay-Ricks*, a practice common in America, and consists in mixing salt with the hay as they stack it.

A correspondent of the editors of the *Museum Rusticum* recommends this practice greatly, declaring that hay which has to all appearance been spoiled by the rain, will spend as well as that made and ricked in the finest weather.

"Just before I left America, says he, I had a crop of hay, which was in a manner spoiled by the rain, being almost rotted in the field; yet did this hay spend as well as if it had been got in ever so favourably.

"When my servants were making up the stack, I had it managed in the following manner; as soon as the bed of hay was laid about six inches thick, I had the whole sprinkled over with salt; then another bed of hay was laid, which was again sprinkled in the same manner; and this method was followed till all the hay was stacked.

"When the season came for cutting this hay, and giving it to my cattle, I found that so far from refusing it, they eat it with surprizing appetite, always preferring it to the sweetest hay, that had not been in this manner sprinkled with salt." *Museum Rusticum*, vol. II. *p.* 210.

BRITE,

BRITE, a word applied to hops when they are over ripe or ſhatter, in which caſe they are ſaid to brite.

BROAD-WHEELED *Waggon. See the article* WAGGON.

BROKEN-WIND, a very fatal diſeaſe to which horſes are too often ſubject.

This diſorder hitherto ſeems to have been little underſtood; but Mr. Gibſon is inclined to think, that the ſource of it is frequently owing to injudicious, or haſty feeding young horſes for ſale; by which means the growth of the lungs, and all the contents within the cheſt, are ſo increaſed, and, in a few years, ſo preternaturally enlarged, that the cavity of the cheſt is not capacious enough for them to expand themſelves, and perform their functions.

A narrow contracted cheſt with large lungs may ſometimes naturally be the cauſe of this diſorder; and it has been obſerved, that horſes riſing eight years old, are as liable to this diſtemper, at a certain period of life, as men fall into aſthmas, conſumptions, and other chronic diſeaſes.

The reaſon why this diſorder becomes more apparent at this age may be, that a horſe comes to his full ſtrength and maturity at this time: at ſix commonly finiſhes his growth in height; after which he lets down his belly, and ſpreads, and all his parts are grown to their full extent; ſo that the preſſure on the lungs and midriff is now more increaſed.

But how little weight ſoever theſe reaſons may have, repeated diſſections have given ocular proofs of a preternatural largeneſs, not only of the lungs of broken-winded horſes, but of their heart and its bag: and alſo of the membrane which divides the cheſt; as well as of the remarkable thinneſs of the diaphragm or midriff.

This diſproportion has been obſerved to be ſo great, that the heart and lungs have been almoſt of twice their natural ſize; perfectly ſound, and without any ulceration whatever, or any defect in the wind pipe or its glands.

Hence it appears, that this enormous ſize of the lungs, and the ſpace they occupy, by hindering the free action of the midriff, is the chief cauſe of this diſorder; and as the ſubſtance of the lungs was found more fleſhy than uſual, they muſt of courſe have loſt much of their ſpring and tone.

This fleſhineſs and ſize of the lungs may, in a great meaſure, be the cauſe, why the inſpirations in broken-winded horſes are diſproportionately ſlow; for we may obſerve that they draw in their breath ſlowly, their flanks filling up, and riſing with difficulty: but that their flanks fall ſuddenly, and their breath burſts forth with violence, both from the mouth and noſtrils; inſomuch, that a man in the dark, by holding his hands on the horſe's mouth and noſe, may eaſily diſcover if he is broken-winded.

Whoever conſiders a broken-wind in this light, muſt own that it may be reckoned among the incurable diſtempers of horſes; and that all the boaſted pretenſions of cure, are vain and frivolous, ſince the utmoſt ſkill can amount to no more than now and then palliating the ſymptoms, and mitigating their violence.

We ſhall therefore lay down ſuch methods as may properly prevent this diſorder, when purſued in time; but if they ſhould not ſucceed, we ſhall offer ſome remedies and rules to mitigate its force, and to make a horſe as uſeful as poſſible under this malad.

It is uſual before a broken-wind appears, for a horſe to have a dry obſtinate cough, without any viſible ſickneſs or loſs of appetite; but, on the contrary, a diſpoſition to foul feeding, eating the litter, and drinking much water.

In order then to prevent, as much as poſſible, this diſorder, bleed him, and give him two drams of calomel, mixed up with an ounce of diapente, for two nights ſucceſſively, keeping him cloathed and well littered; and feeding him with ſcalded bran and warm water.

The following balls are then to be taken for ſome time, which have been found extremely efficacious in removing obſtinate coughs:

> Take gum ammoniacum, galbanum, and aſſa fœtida, of each two ounces; ſquills, four ounces; cinnabar of antimony, ſix ounces; ſaffron, half an ounce: make the whole into a paſte with honey; and give a ball about the ſize of a pullet's egg every morning.

Broken-winded horſes ſhould eat ſparingly of hay, which, as well as their corn, may be wetted with chamber-lye, or fair water; as this will make them leſs craving after water.

The volatile ſalts in the urine may render it preferable to water, and may be the reaſon why garlick is found ſo very efficacious in theſe caſes; two or three cloves given at a time in a feed, or three ounces of garlick bruiſed, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very ſerviceable; for by warming and ſtimulating the ſolids, and diſſolving the tenacious juices, which choak up the veſſels of the lungs, theſe complaints are greatly relieved.

Careful feeding and moderate exerciſe has greatly relieved broken-winded horſes; and though for the firſt ſummer they have not been able to endure much labour, yet many have been found leſs oppreſſed the ſecond, and ſome ſcarce perceptibly affected the third; and even able to bear great fatigue; and could a horſe be kept conſtantly in the field, and taken up only when uſed, he might, by this management, do good ſervice for many years.

But whoever expects to cure his horſe by ſending him out to graſs, will find himſelf diſappointed, eſpecially if he remains abroad after the ſpring graſs; for on his return to the ſtable and dry meat, he will be more oppreſſed and ſhort breathed than before, for want of the open air, and the moiſt food he has been accuſtomed to.

Horſes ſent to graſs in order to be cured of an obſtinate cough, have often returned completely broken-winded, where the paſture has been rich and ſucculent, ſo that they have had their bellies conſtantly full. As the ill conſequence therefore is obvious, where you have not the convenience of turning out your horſe for a conſtancy, you may ſoil him for a month or two with young green barley, tares, or any other young herbage.

To purſive, thick winded horſes, Barbadoes and common tar have often been given with ſucceſs, to the quantity of two ſpoonfuls mixed with the yolk of an egg, diſſolved in warm ale, and given faſting two or three times a week, eſpecially on thoſe days you hunt or trave'.

But in order to make all these sorts of horses of any real service, the grand point is to have a particular regard to their diet, observing a just œconomy both in that and their exercise; giving them but a moderate quantity of hay, corn, or water, at a time, and moistening the former to prevent their requiring too much of the latter, and never exercising them but with moderation, as has been before observed.

The following ball may be given once a fortnight or three weeks; and as it operates very gently, and requires no confinement, except the days it is given (when warm meat and water will be necessary) it may be continued for two or three months.

> Take succotrine aloes, six drams; myrrh, galbanum, and ammoniacum, of each two drams; bay berries, half an ounce; oil of amber, a spoonful: make the whole into a ball with a sufficient quantity of syrup of blackthorn. *Bartlet's Farriery*, *p.* 68.

BROODING, that act of a hen, or other bird, sitting on a number of eggs, to keep them warm, till they hatch, or produce young ones.

BROOM, the name of a plant, of which two species are natives of this country, called the common and the small broom.

The common broom is the *genista trifonia* of Mr. Ray. It rises about three feet in height, with shrubby stalks, garnished with spear-like leaves, and terminated by loose spikes of yellow flowers, succeeded by short pods, which turn black when ripe, and contain four or five kidney-shaped seeds. It flowers in June or July, and the seeds ripen in autumn. The flowers of this plant are used by the dyers to give a yellow colour; whence it is called dyers broom, green-wood, wood-waxen, or dyers weed.

The small English broom, called also petty-whin, is the *genista spartium minus Anglicum* of Tournefort. It rises like the former, with a shrubby stalk, but only to the height of about two feet, sending out many slender branches, which are armed with long single spikes, and garnished with very small spear-shaped leaves, placed alternately on every side of the branches. The flowers branch out without spines, short, and have five or six yellow flowers growing in a cluster at the end. They come out in April and May, and are succeeded by short turgid pods, containing four or five small kidney-shaped seeds, which ripen in July. This sort grows naturally upon open heaths, in many parts of England.

The twigs of broom are excellent for thatching barns, &c. being very tough, and of long duration. Ropes also, and those not bad ones, are made of the stringy fibres of this plant, of which the ancients used also to make a kind of flax.

According to Mr. Bradley's calculation, an acre of broom is worth upwards of six pounds annually, for the feeding of bees only, besides the wythes and stumps, which will pay for the rent of the land. Certain it is, that no flowers are more pleasing, or more profitable to bees, than those of broom.

But considered it as a weed, it is one of the most pernicious plants that grows upon the land; for its roots penetrate deep, and, at the same time it sheds no leaves, so that it is continually sucking the moisture from the earth. The best method of destroying it, is by burning the land, then ploughing it deep, and manuring it very well with dung and ashes; or by spreading on the land chall or marle, or manuring it with urine. If the ground be designed for pasture land, it is best to cut the broom close to the ground in May, when the sap is strong in it. By this artifice the roots are destroyed; whereas in the common way of pulling up the young plants, some strings of the roots will be left, and the least of these will grow. Foddering of cattle upon broomy land is one very good way of destroying the broom, their urine killing the roots, and their treading the land makes it less proper for the roots to extend themselves; for broom is seldom seen to grow near old paths. *Bradley's Husbandry*, *vol.* I. *p.* 181. *Mortimer's Husbandry*, *vol.* I. *p.* 308. *Mills's Husbandry*, *vol.* III. *p.* 361.

BROWN, a dusky kind of colour, inclining somewhat towards redness.

A brown horse is not reckoned altogether so beautiful as the bay or chesnut. There are also degrees of this colour, some being light, and others very dark. They have almost always black manes and tails, and often their joints are black, though not so shining as the bays, but rusty. Almost all brown horses grow gradually lighter towards their bellies and flanks, and many are light about their muzzles. The most beautiful are those which happen to be finely dappled, for the plain brown are esteemed more ordinary. Many of them are coarse, but strong and serviceable, fit for draught, for burden, or for war. *Gibson on horses*, *vol.* I. *p.* 46.

BROWN-STOUT, a name given in some parts to strong brown beer, brewed from brown high-dried malt.

BROWSE, branches fit for the food of goats, &c.

BRUISE, a hurt caused by the force of something blunt and heavy.

Horses and other cattle are very subject to bruises from various accidents; but as the blood is no ways affected in these cases, one general method of cure is only necessary; and that is by coolers and repellers, such as white wine vinegar, old verjuice, or compositions made with allum, vitriol, and the like, which should be applied frequently to the swelling, till the heat and inflammation is abated.

BUCK-BEAN, or *Marsh-trefoil*, *trifolium palustre*, a plant with large oval leaves, pointed at each end like those of a garden bean, set three together on long pedicles, which embrace the stalk to some height, and there parting, leave it naked near the top, where issues a short spike of pretty large, reddish, monopetalous flowers, each of which is cut into five segments, hairy on the inside, and followed by an oval seed-vessel. It is perennial, grows wild in marshy places, and flowers in May.

Sheep, when sound and in health, always avoid eating buck-bean; but when the symptoms of the rot begin to attack them, they search for it by instinct, and devour it greedily. Where such sheep are pastured, no buck-bean is to be found, for in a week or two they devour it all. Might it not be prudent, therefore, in husbandmen, who graze large flocks, to cultivate an acre of this plant in some morassy ground, which otherwise would not yield them two shillings the acre? Some might be cut up green, for unsound sheep, and given them with lucern, as occasion requires; and some might be

be made into hay, and mixed with their fodder. I cannot remember that this advice has been given by any huſbandry writer. *Eſſays in Huſbandry*, *Eſſay* II. *p.* 137.

BUCK-WHEAT, the name of a plant generally conſidered as a ſpecies of corn, though not ſuch in fact; nor does it grow like any of the eſculent grains. Its leaf, from being roundiſh at firſt, takes nearly the ſhape of that of ivy, but longer pointed, and much ſofter. Its ſtalk is round, hollow, and weak, ſometimes reddiſh, but muſt commonly green, and growing to the height of about two feet and a half. Lateral branches, which ſhoot out almoſt at every joint, are terminated by purpliſh flowers, which are ſucceeded by ſmall triangular ſeeds, black on the outſide, and white within.

Buck-wheat will thrive in any ſoil, not excepting even barren ſands, as they are commonly termed; but grows largeſt in dry ground which have been well ploughed. When raiſed for its grain, a buſhel of ſeed is ſufficient for an acre of land, which will frequently yield fifty or ſixty buſhels: but when it is intended for green fodder, which is the uſe moſt commonly made of it here, ſome people ſow three or four buſhels on an acre, in order to have a thick crop. The uſual time of ſowing it is about the beginning of May; but if it be ſowed ſomewhat earlier, and a warm ſeaſon enſues, it will bear, cutting twice in the ſummer. It comes up ſoon, and ripens generally, according to M. du Hamel, in one hundred days after ſowing, ſo that buck-wheat ſown in June is reaped in September.

When mowed, it muſt be left in the field ſeveral days, that its ſtalk may dry before it is houſed. There is little danger of the ſeeds falling out, nor is it much injured by wet. Theſe ſeeds are excellent food for pigeons, poultry, hogs, rabbits, &c. and are found to make horſes thrive when given among their oats: but for theſe they ſhould be firſt cracked in a mill; being apt, otherwiſe, to paſs through them whole. The flower of buck-wheat is very white, and makes a good ſort of pancake, when mixed with a little wheat-flour. The poor in ſome countries make even bread of this mixture; but it is black, bitter, windy, and not nouriſhing. Its ſtraw, or haulm, is alſo given dry to cattle: but the beſt way is to feed it whilſt green, particularly juſt before it bloſſoms. Milch-cows fed with it will yield an extraordinary quantity of milk, remarkably good for making butter and cheeſe: and another advantage attending this paſture is, that it will continue green in the drieſt time of ſummer, when other graſſes are burnt up. It is an excellent dreſſing for land, where ploughed in without being mowed.

The ingenious author of the Eſſays in Huſbandry tells us, that in certain lands of Brabant, called Rempen, the huſbandmen raiſe buck-wheat in ſmall fields near home, and place round them, under the hedges, a great number of bee-hives, from whence they draw conſiderable profit; for no plant affords theſe inſects a better ſupply of materials for making honey. *Eſſay* I. *pag.* 110. *Mortimer's Huſbandry*, *vol.* I. *pag.* 136. *Du Hamel's Elements of Agriculture*, *vol.* I. *pag.* 91. *Maiſons Ruſtiques*, *tom.* I. *pag.* 624.

BUD, that part of the ſeed which firſt begins to ſprout, or rather the leaves which firſt appear.

BUD, alſo ſignifies the ſprout from whence the branch ariſes. Theſe buds in ſome meaſure reſemble ſeeds, as under a number of ſcaly coverings the rudiments of the young branch are ſeen: but neither the lobes nor the young root are met with; becauſe this tender ſtem is connected with a tree, which ſupplies it with the neceſſary food.

BUD is likewiſe uſed in ſome counties in England for a weaned calf of the firſt year; becauſe the horns are then in the bud.

BUGLE, *Middle compound*, *Sicklewort*, or *Herb Carpenter*, the name of a low weed, with two kinds of ſtalks; round creeping ones, which ſtrike root at the joint; and upright ſquare ones, hairy on two of the oppoſite ſides, alternately, from joint to joint, bearing looſe ſpikes of blue labiated flowers, of which the upper lip is wanting: the leaves are ſomewhat oval, ſoft, ſlightly cut about the edges, and ſet in pairs at the joints. It is a perennial weed, infeſting moiſt meadows and paſture-grounds, and flowers in May.

BUGLOSS, or *Viper's Bugloſs*, the name of a plant whoſe ſtalks are rough, round, ſolid, erect, undivided, and marked with black ſpots: the leaves are very rough, long, narrowing to a point, and placed without any certain order. The flowers are large and ſpacious, of a beautiful blue colour, and grow in long bending ſpikes. They conſiſt of one petal divided into five roundiſh ſegments, of different ſizes, and reſemble a horn in their figure, expanding by degrees, from a narrow beginning. The flower cup conſiſts of five narrow ſegments, and contains four rough ſeeds.

Bees are very fond of the viper's bugloſs, and there is reaſon to think that this plant, aſſiſted by the culture of a ſkilful gardener, may receive, perhaps, as many improvements as the auricula did. Its branches will riſe to the height of three feet, and no vegetable would better adorn flower-pots in large chimnies; for if the water be changed, it continues blowing near a fortnight after cutting. Its ultra-marine, blue-colour, is the fineſt that can be ſeen, and the ſtalks are garniſhed with flowers from top to bottom; dyers might, perhaps, extract an uſeful tincture from the roots. This plant grows wild in hard braſhy ſoils. *Eſſays in Huſbandry*. *Eſſay* I. *p.* 110.

BUILDING. *See the article* FARM-HOUSES.

BULL, the male of the ox kind. *See the article* OX.

The bull, kept for propagating the ſpecies, ſhould have a quick countenance, his forehead broad and curled, his eyes black and large, his horns large, ſhort, and black, his neck fleſhy, his belly long and large, his hair ſmooth like velvet, his breaſt big, his back ſtrait and flat, his buttocks ſquare, his thighs round, his legs ſtrait, and his joints ſhort; this ſort of bull is the beſt for breed, and makes the beſt ox for draught. *Mortimer's Huſbandry*, *vol.* I. *p.* 226.

The bull chiefly ſerves for propagation; and though he may be ſubject to the yoke, yet there is no being certain of his working quietly, and the uſe he may make of his prodigious ſtrength, is conſtantly to be guarded againſt. This creature is naturally untractable, ſtubborn, and fierce; and in the bulling ſeaſon, abſolutely uncontroulable, and often furious; but, by caſtration, the ſource of theſe turbulent impulſes is deſtroyed, without the leaſt diminution of his ſtrength. He alſo grows larger, more heavy and unwieldly, and becomes more adapted to the labour for which he is deſigned. This operation alſo renders him more tractable, patient, docile, and leſs troubleſome to others. A herd of bulls

could not be either tamed or managed by human ſkill. *Buffon's Hiſtoire Naturelle, tom.* IV.

BULLEN, hemp ſtalks ſtripped from the bark.

BULLIMONG, or *Bullimony*, a mixture of oats, peaſe, and vetches.

BULLS-FOOT, the ſame with colts-foot. *See* COLTS-FOOT.

BULLWEED, *Great Knapweed*, or *Matfellon*, the name of a perennial weed common among corn; it riſes to about two feet high; the ſtalks are round, ſtreaked, and hoary: the bottom leaves are oblong and undivided, but thoſe which grow on the ſtalk are cut and divided. The flowers reſemble thoſe of the blue-bottle in ſhape, but are of a red colour. The ſeed is ſmall, oblong, reddiſh, and hairy in the upper part.

BUNS, the ſtalks of hemp after the bark is taken off.

BURN-BAKING, or *Burn-beating*, often called *Denſhiring*, or *Devonſhiring*, from its being long practiſed in that country, a method of cutting up the turf, and after drying and burning it, the aſhes are ſpread over the ſurface by way of manure.

This method of improving land is very ancient, Virgil mentions it, and it has been practiſed time out of mind in Cornwal and Devonſhire. The marquis of Tourbilly has founded his famous treatiſe *Sur les Défrichemens*, publiſhed in 1761, principally on the art of burn-baking. We ſhall here give the ſubſtance of what the marquis has delivered on that intereſting ſubject.

When it is intended to break up any piece of waſte-ground, the nature of it ſhould be firſt conſidered, and may, in a great meaſure, be known from its natural produce, which is generally heath, ruſhes, fern, broom, furze, brambles, &c. intermixed with graſs: for, from the height, thickneſs, and vigour of this wild growth, a proper judgment may be formed with regard to the degree of the goodneſs of the ſoil, and what may reaſonably be expected from it.

When ſuch ground is to be broken up, it will be right to begin in the winter in order to get rid of the three principal obſtacles, namely, water, ſtones, and ſuch large roots as the paring mattock, or beating axe, as it is called in the weſt of England, may not be ſtrong enough to cut. Afterwards, about the middle of March, the paring of this ground ſhould be begun, by a number of labourers proportioned to the extent of the land intended to be pared.

Every one of theſe labourers muſt be provided with a paring-mattock, or beating-axe, the form of which is repreſented on Plate II. Fig. 1. Towards the edge, where it is ſharpened like an addice, it ſhould be made of well tempered ſteel, and about nine inches wide. From thence the iron part, which ſhould be ſix inches in length, leſſens in breadth towards the handle, as in Fig. 2. where it is reduced to three inches. All the upper part muſt be made of the beſt iron, and ſhould be formed ſomewhat hollow, with a little bending inward. It ſhould be ſtrongeſt in the middle, and of a thickneſs proportioned to its ſize, as well as to the work, for which it is intended. The hole to receive the handle ſhould be two inches in diameter, and the handle ſhould be of wood, about three feet long, or a few inches more or leſs, according to the height of the man who uſes it. This inſtrument, excluſive of the handle, ſhould weigh from ten to twelve pounds, according to the ſtrength of the labourer: as leſs weight would not be ſufficient for the purpoſe.

The ſtouteſt and moſt intelligent labourer muſt be then ſingled out to lead the reſt; for they cannot work in a row as when they dig. This leader ſtanding in a proper poſture to manage his beating-axe, muſt give two ſtrokes with it, cutting into the ſoil, to the right, two more ſtrokes to the left; and afterwards a fourth ſtrait before him; by which means he will immediately raiſe a turf about a foot and a half long, a foot broad, and four inches thick of earth. This turf reſting upon the axe as it was cut, is then, with one motion, to be placed on the labourer's right-hand, in its natural poſition, with the mould ſide downwards. (See Plate II. Fig. 3. where *a*, *a*, *a*, are three turfs as cut from the ſoil.) All the wild growth upon his land, will, if not very large, come off with the turfs thus cut; and the more there is of it, the better it will be. The turf muſt abſolutely be cut with a depth of at leaſt four inches of ſoil: for if the ground be pared to a leſs thickneſs, the work will be badly done; becauſe the beating-axe will not have gone under the netted roots of all the rubbiſh growing on the ſurface, which it is indiſpenſably neceſſary to deſtroy: otherwiſe theſe roots will make freſh ſhoots, injure the corn, and in time choak it entirely, as has happened to me in the beginning of my undertakings.

The workmen, eſpecially if they undertake the work by the acre, would be glad to take this turf off as thin as poſſible; becauſe that would ſave them a great deal of time and labour. But I have experienced to my coſt the imprudence of making ſuch bargains. They muſt therefore be well watched; for otherwiſe, beſides the inconvenience of not effectually deſtroying the wild growth, ſuch thin turf would not yield a ſufficient quantity of aſhes for manuring the land. The buſineſs will indeed go on ſlower, but practice will ſoon render the workmen more expert.

Their leader having cut a turf, and placed it on his right-hand ſide, muſt then advance a ſmall ſtep, and take off another of the ſame ſize and thickneſs, which he muſt alſo place on the ſame ſide, in a line with the former, on the further end of which the neareſt end of this ſhould reſt, ſo as to incline a little. He is then to proceed ſtrait on, laying all the turfs in the ſame manner. As ſoon as he has taken up the two firſt turfs, the ſecond labourer, ſtanding on his left hand ſide, is to take up his line of turfs in the ſame manner, and place them on his right, in the void ſpace cleared by the leader. As theſe advance, each of the other labourers, ſucceſſively one after the other, muſt put himſelf on the left of the preceding, at the ſame diſtance, and do the ſame work, following each other like reapers. Thus, if the firſt began at B (Plate II. Fig. 10.) he lays his turfs along the line which terminates the plate; and when he has cut two turfs, the ſecond begins at C, and lays his turfs in the ſpace BA, cleared by the firſt. The third follows the ſecond in the ſame manner, clearing the ſpace FE, and laying his turfs in the ſpace CD, cleared by the ſecond. The fourth clears the ſpace GH, and the fifth JK, and ſo on. The ſame muſt alſo be underſtood of Fig. 8, and 9, which therefore require no further explanation.

When the labourers come to the end of the ground, which will likewiſe be in progreſſive order, the leader muſt return to the ſide where he firſt began, and reſume his work cloſe to the ſpace already pared, the others are

Fig. 1.



Fig. 2.

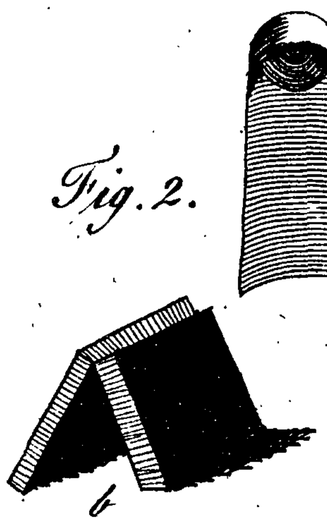


Fig. 3.

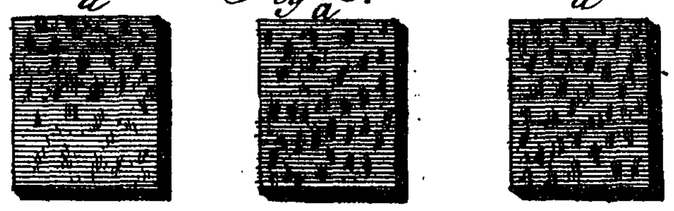


Fig. 4.



Fig. 5.

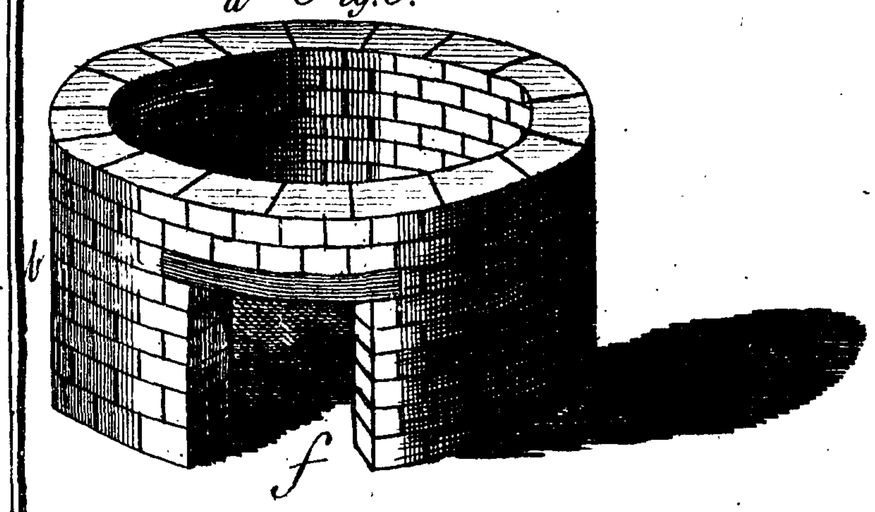


Fig. 6.

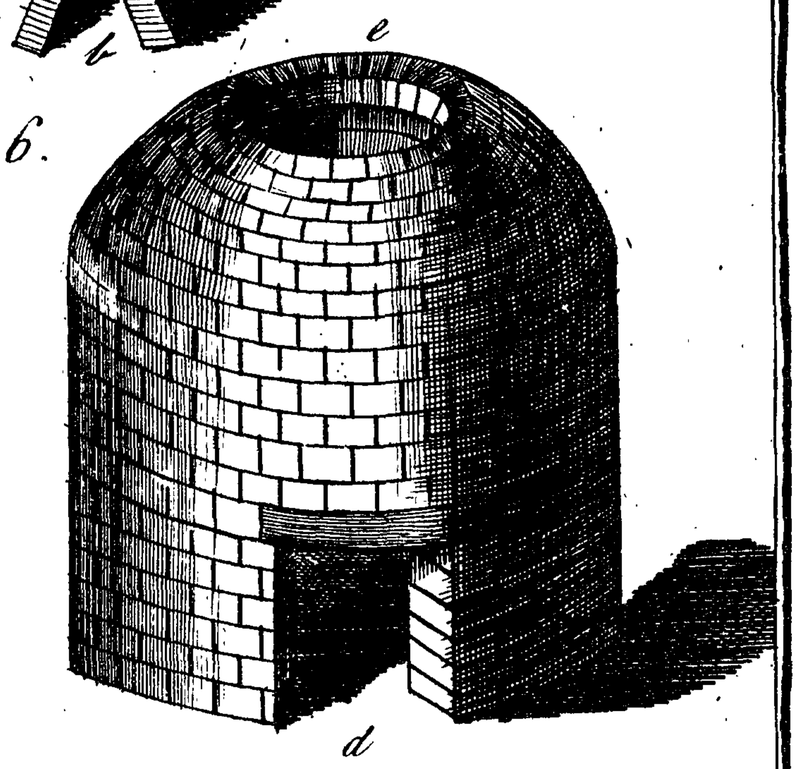


Fig. 7.

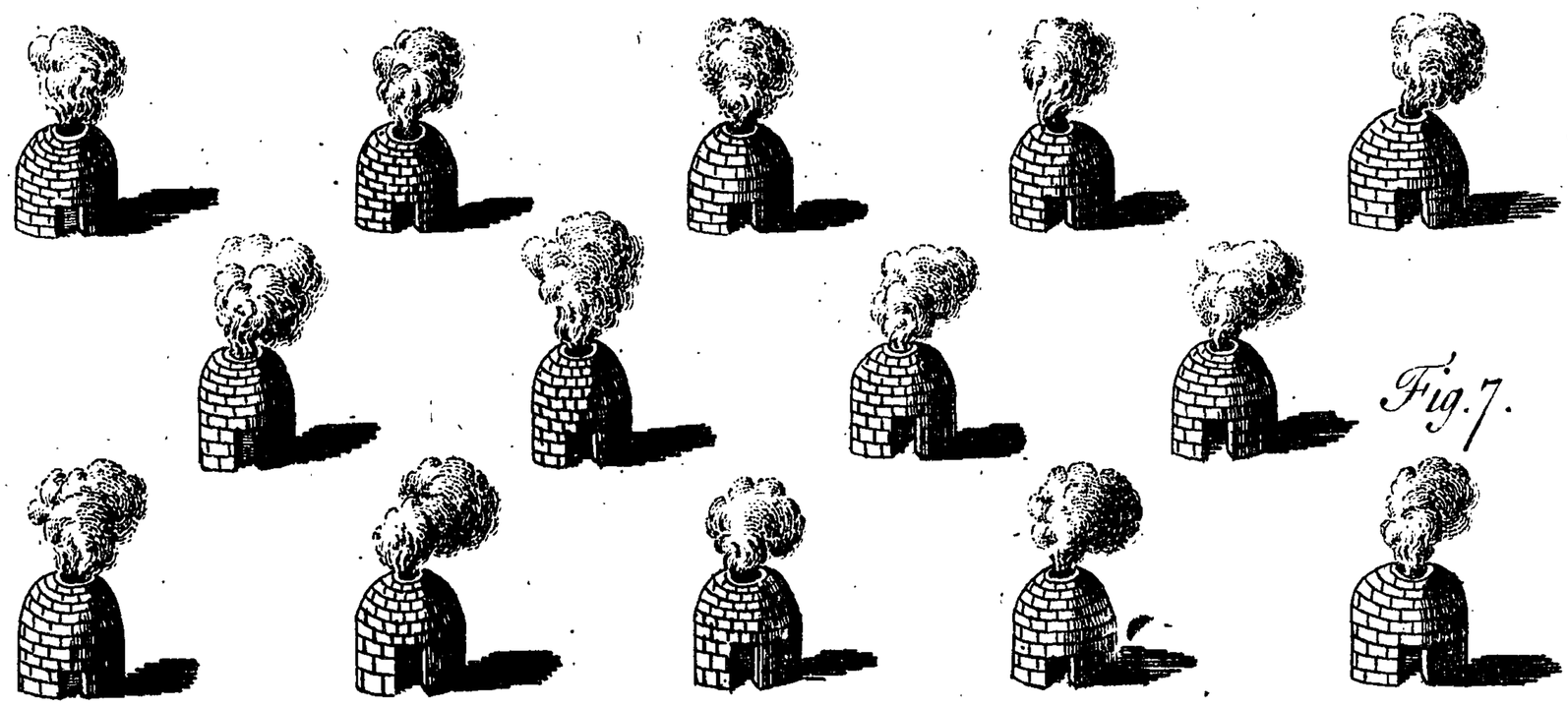


Fig. 8.

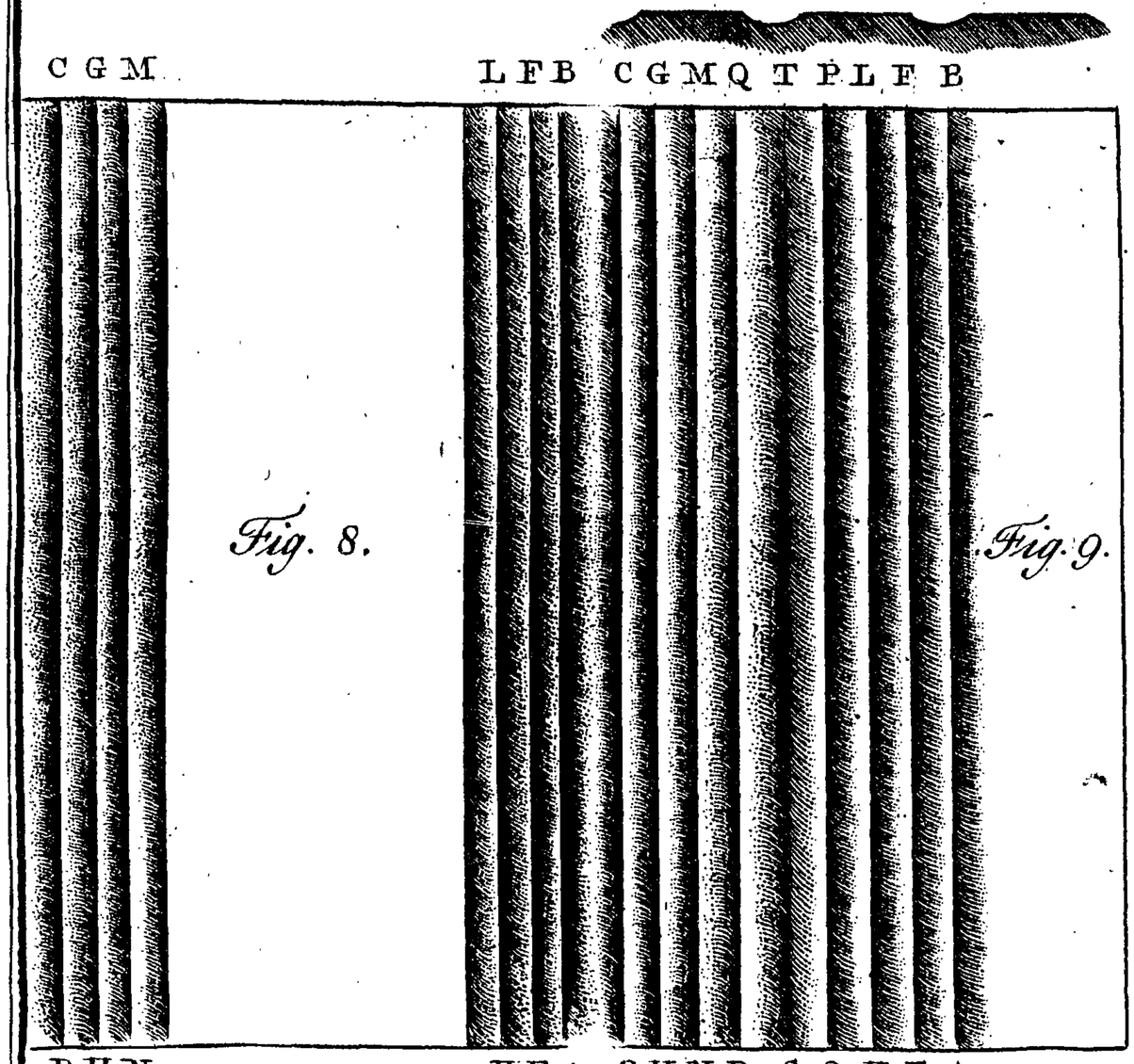
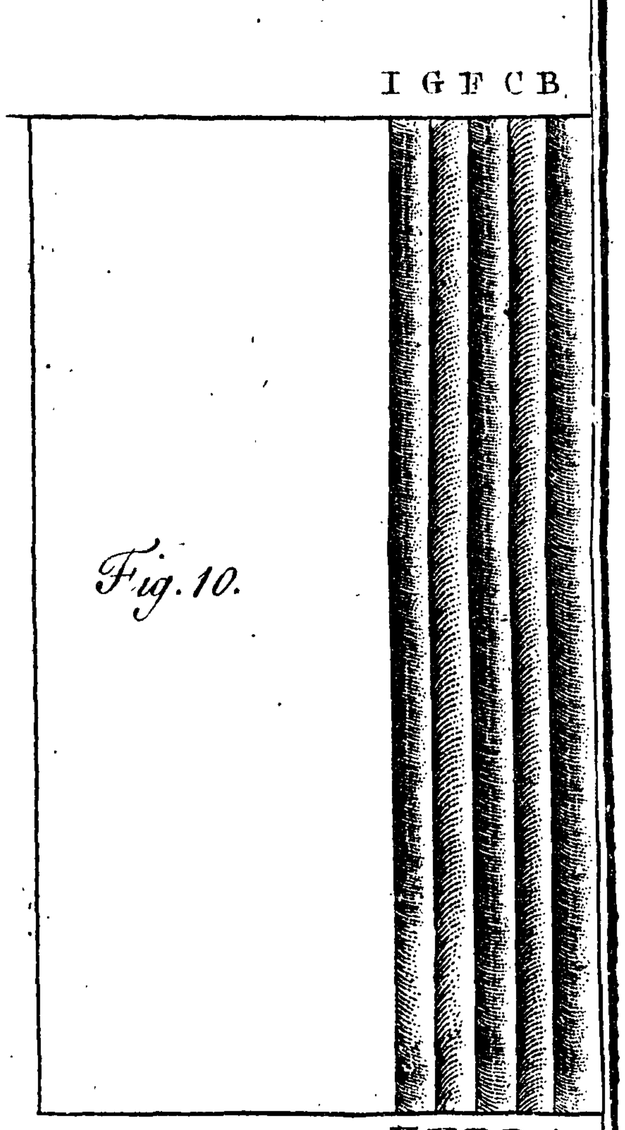


Fig. 9.

Fig. 10.



are to follow in their regular turns, and repeat the ſame operations as before; for this work muſt always be performed in the ſame direction, and not backwards and forwards. Such ſhould be the method till the whole ground is pared.

If, as it is ſometimes happens, there be reaſon to apprehend that the ſods will not dry faſt enough when only laid a little ſlanting, with the end of one juſt reſting upon the extremity of another; they may in this caſe be piled, as faſt as they are cut, in little heaps of three, four, or five together, according to their thickneſs, and the quantity of combuſtible or vegetable matter contained in them. The air paſſing between theſe ſods, which are always laid with the heath or turfy ſide uppermoſt, penetrates and ſoon dries them, eſpecially if the weather be ſultry: but at the ſame time it would be wrong to wait till they are quite dry, becauſe they would then burn too much, and too faſt; in which caſe their aſhes are neither ſo good, nor in ſo great quantity, as thoſe of turf more ſlowly burnt. A juſt medium, which practice will eaſily teach, is to be obſerved in this reſpect.

Sometimes theſe turfs are ſet upon their ends, two and two meeting at the top, and being further aſunder at the bottom, like the roof of a houſe, with their heathy ſides outwards, as repreſented at *b*, *b*, *b*, (Pate II. Fig. 4.) but this method, which lengthens the work, and therefore renders it more expenſive, is fitteſt for the turfs of bogs or marſhes, when cut too wet.

With reſpect to the roots, which I ſaid muſt be got rid of before any land can be properly broken up, I meant only ſuch large roots as the beating-axe cannot cut through, though ſharpened with a whet-ſtone from time to time, when its edge is either turned or blunted. For with regard to the roots of ſmaller ſize, ſuch as thoſe of the dwarf furze, the common heath and young fern, ſmall holly, young plants of thorns and junipers, brambles, broom, and other wild productions, which have not attained too great ſtrength, will, without much difficulty, be cut and pared off with the turf.

But the ſtrong roots of ſhrubs, buſhes, &c. which the beating-axe cannot ſever, muſt remain in the ground, though that will not hinder our taking off the turf between them to a proper thickneſs. The ſods thus cut will indeed be often very irregular in length and breadth; but they are the better for burning, as they contain a greater proportion of vegetable matter.

It has been already obſerved, that theſe turfs ſhould be laid in little heaps as they are cut; theſe ſhould be placed in the intermediate ſpaces, where the ground has been placed between the roots yet remaining in the earth. Theſe roots ſhould be grubbed up with a ſpade, pickaxe, &c. without diſordering the little piles of ſods. It will be ſufficient if, this work be finiſhed before the time of ſowing. *See the article* GRUBBING.

Some grub up theſe roots before they burn the turf, and others after, as beſt ſuits their convenience: but in the latter caſe they ſhould certainly be taken up in thoſe places where the furnaces are to be made, becauſe it is of great importance not to ſtir the heaps of aſhes produced by them, till the very inſtant of ſowing. The holes alſo made by pulling up large roots, ſhrubs, &c. ſhould be filled up ſo as to render the ſurface even. In countries where wood is ſcarce, theſe roots, ſtumps, &c. are carried away, and dried for fuel, eſpecially for the kitchen; by which means they frequently repay at leaſt the expence of grubbing them up. But in places where wood is of ſo little value as to render theſe not worth the carrying off, the beſt way is to burn them with the turf, the aſhes of which they will both increaſe and improve.

The thicker any land is covered with theſe wild productions, the better it will prove. If it coſts more than another parcel of ground to break up, and bring it into order, it will, in return, make ample amends, by producing greater crops.

When the ſeaſon is not too wet, the turfs will generally dry ſufficiently in about three weeks, even without being turned; but in rainy years they require a longer time, and muſt be turned again and again, to prevent their ſtriking out new roots and ſhoots, which would hinder them from burning, as I have ſeen happen. Hence it appears, that this method of clearing and breaking up ground requires a longer time, and is attended with more labour and difficulty in rainy than in dry ſeaſons. But as the turfs may be turned by women and children, the additional expence will not be very conſiderable.

About Midſummer, or a few days before, when the turfs are ſufficiently dry, a number of women and children ſhould be employed, in fine clear weather, to gather them all up, ſome with iron forks, others with their hands, and pile them up from ſpace to ſpace, in round heaps about ten feet high, and of the ſame width at bottom, almoſt in the ſhape of charcoal furnaces. The heathy ſide of the turf muſt be placed downwards, and the earthy ſide upwards. A ſmall hollow ſhould be left in the inſide, in order to form a kind of chimney, the opening of which ſhould face the wind. *a b* (Plate II. Fig. 5.) repreſents a furnace of this kind partly built, where *f* is the door, or opening into the chimney of the furnace. Fig. 6. is a furnace completed, where *e* is the top of the chimney, and *d* the door. Fig. 7. repreſents a great number of theſe furnaces on fire.

It has been already obſerved, that this work muſt not be ſet about in rainy weather; becauſe if the heaps of turf ſhould unfortunately be ſo much wet as to imbibe the water, they would not burn, but muſt be pulled down and ſpread anew, to dry as before. They might alſo, in this caſe, require very frequent turnings, as has happened to me; which would retard the operation, and increaſe the expence: beſides which, it might not even be poſſible, by frequent turnings, to dry them ſufficiently, before autumn, if the rains were frequent, which muſt occaſion a very conſiderable loſs.

However, this laſt accident, though poſſible, is very rare. It never befel me; and by inquiring of thoſe to whom it has happened, I found that it was, in a great meaſure, owing to their own negligence. The beſt method to avoid theſe inconveniencies is, to embrace the advantage of the firſt fine weathar, and if it appears at all uncertain, to ſet more hands to work, without aiming at an ill-timed ſaving: for it is upon the due piling up and burning of the turfs, after being properly cut and dried, that the whole ſucceſs of this important branch of huſbandry chiefly depends. It cannot therefore be done too ſpeedily. When rain is apprehended, every other buſineſs ſhould be left for this, and all hands, men, women, and children, ſhould be inſtantly employed, to diſpatch it as ſoon as poſſible. Nothing requires greater

diligence. The heaps ſhould be ſet on fire the moment they are finiſhed, or at leaſt, though the weather ſhould ſeem ſettled, before the huſbandman retires in the evening. Children may do this, by putting a little lighted ſtraw or heath, with an iron fork, into the chimnies of the furnaces. The dry heath, graſs, and roots, will catch inſtantly, and in a few moments the fire will become ſo violent, as ſcarcely to be approached. It may then be left, after taking proper precautions to prevent its extending further than it ought; eſpecially if it be near any wood, hedge, or heath, where it might otherwiſe do great miſchief.

The misfortunes occaſioned by fire have been ſo numerous and dreadful, that too much care cannot be taken to guard againſt them. If the ſituation of the land which is to be burned be ſuch as gives the leaſt room to fear any danger of this kind, the furnaces ſhould only be lighted in calm weather; leſt the wind ſhould ſpread the flames to neighbouring grounds, where it might be impoſſible to ſtop them till they had done irreparable damage.

If it be ſurrounded on all ſides with woods, heath, or other vegetables eaſily ſet on fire, a row of furnaces ſhould, in this caſe, be made around the land to be burned, at the diſtance of twenty-five, or thirty feet from the neighbouring grounds, and at leaſt ten feet from the other furnaces, which are afterwards to be built farther within this incloſure. Care ſhould then be taken to obſerve from which ſide the wind comes, and fire ſhould be ſet to thoſe furnaces that are ſituated fartheſt from the wind, or neareſt to that ſide on which the wind blows. A number of men ſhould watch theſe furnaces while they burn, and ſhovel up earth upon them, if they are ſo full of heath or combuſtible matter as to occaſion too violent a flame.

The throwing on of this earth will deaden the flames, and concentrate the fire; by which means the furnaces will be conſumed by ſlow degrees, without hurting either the outward borders of the pared land, or its inner parts, where this fire might do miſchief two ways; firſt by ſpreading to, and burning the yet unpiled turfs, the aſhes of which would ſoon loſe their virtue, if ſcattered upon the ſoil in this looſe manner; and ſecondly, by catching the other furnaces, in caſe they ſhould be already made; by which means the fire would ſoon become ſo great, that it would not be longer poſſible to ſtop its progreſs, or prevent its extending to the neighbouring grounds.

When the firſt row of furnaces is thus conſumed, the next row may be burnt in the ſame manner, and ſo on till the whole is finiſhed.

The morning is doubtleſs the moſt proper time for lighting all theſe furnaces, becauſe the people employed in buſineſs have then the whole day before them, to watch the fire and prevent accidents, which it might be very difficult to remedy in the night, particularly during the firſt violence of the flames. A number of proper perſons proportioned to the extent of the ground, ſhould remain upon the ſpot all night, as well to attend the burning of the turf, as to hinder wicked wretches from ſetting fire to other places, of which there have been too many inſtances.

By not neglecting any of theſe precautions, though all of them are not neceſſary where the fire cannot ſpread to adjacent grounds, every inconvenience may certainly be avoided.

If it ſhould be found neceſſary to light the furnaces in the evening, though as I have juſt obſerved, the morning is a much fitter time for it, they muſt be ſuffered to continue burning till the next day, when the violence of the fire will be abated. A few men, or even women and children, ſhould be then ſent in among the heaps, with iron forks, to give them a little ſtirring, and lay upon them the turf which may have fallen down. Theſe furnaces will ſtill continue burning for ſome days, during which the turfs will be ſlowly conſumed or calcined. If any of them ſhould be ſituated on wet ſpots, where they will not burn, theſe women and children muſt mend them, and add freſh fuel, ſuch as dry heath, ſtubble, or even a little dry wood, with ſome of the burning turfs from the adjacent furnaces. As ſoon as the fire is extinguiſhed in all the heaps, which will be then reduced to heaps or aſhes, finer or coarſer in proportion to the goodneſs of the ſoil, the women and children muſt ſhovel them up into little round heaps, leſt they ſhould loſe their fertilizing quality, if left in the manner they fell in their burning: for all our treaſures conſiſt in the ſalts contained in theſe little heaps, and the volatile parts of thoſe ſalts, which are much the beſt, would ſoon fly off, if expoſed to the air. The dews at night, and the firſt rain which falls upon thoſe heaps of aſhes, form on their ſurface a cruſt, which hinders their being blown away by the wind, renders them impenetrable to the action of the air, and keeps in all their virtue: the ſooner therefore rain falls after this operation, the better. Nor would it be any injury if it ſhould rain as ſoon as the furnaces are thoroughly lighted, unleſs it ſhould be very violent indeed, and of long continuance, which rarely happens at this reaſon.

When the aſhes are thus laid up in little heaps, nothing more remains to be done to this ground till the time of ſowing; care indeed muſt be taken, that neither men nor cattle approach them ſo as to break their cruſt. The land will from hence be freed from all ſeeds of weeds, and other wild productions, as well as from all worms, inſects, reptiles, and venomous creatures; the action of the fire of the furnaces being ſo ſtrong, that it heats not only the earth, beneath them, to the depth of ſeveral inches, but likewiſe all the intermediate ſoil.

A fortnight after the uſual ſeed-time of the country, for wheat and rye, will be early enough to ſow this burnt ground. When that is to be done, a number of women and children ſhould be ſent into the field, on a ſtill, calm day, with wooden ſhovels, to ſpread the aſhes equally over all the ground, excepting the ſpots where the furnaces were; for theſe are ſo thoroughly burnt, that they want no farther manure, and are always obſerved to produce the fineſt corn. Some of theſe women and children ſhould alſo carry iron forks, to break and ſpread ſuch turfs as may not have been thoroughly conſumed; for theſe having been baked or calcined by the action of the fire, will be very beneficial to the land.

Immediately after the aſhes are ſpread, the corn, whether wheat or rye, ſhould be ſown over thoſe aſhes by a ſkilful ſower, in not more than about half the quantity generally uſed for a ſimilar extent of other ground. The ploughman ſhould follow the ſower, with his team, either

either of horſes or oxen, yoked to a ſtrong plough, having two fins to the ſhare. *See the article* PLOUGH. He ſhould not however, cut too deep this firſt year, but make only ſhallow furrows, going and returning, to cover the ſeed. Women and children, with hoes and iron forks, ſhould then be employed to break carefully all the clods, together with every remaining bit of turf; and finally to cloſe the tops of the ridges, which the plough cannot do with the neceſſary exactneſs in this ploughing. If ſeveral ploughs work at the ſame time, as is generally the caſe with many, the number of women and children muſt be increaſed in proportion, and there muſt be a ſower before each plough.

It is very difficult to ſow theſe lands with half the quantity of ſeed generally uſed in other places. The moſt dexterous are apt to miſtake, and I have experienced the bad effects of employing only one ſower for ſeveral ploughs. A man who goes before each of them will ſow much more equally: nor need he even loſe any of his time, becauſe when he is not employed in ſowing, he may help the women and children to break the clods. The ploughman ſhould always proceed ſlowly and cautiouſly in this firſt tillage, eſpecially if the ground ſeems never to have been ploughed before. If his plough ſhould chance to be ſtopped by any ſtones or roots, which may have eſcaped the endeavours uſed to diſcover them by means of the borer (which ſhould be always had recourſe to as ſoon as the ſurface of the ground is cleared) the other men within call, or even the women and children, muſt immediately take them up with crows, and pick-axes, and carry them out of the field.

Care muſt alſo be taken not to ſpread the aſhes out of the heaps over more ground than can be ſown in the ſame day and the next morning, that they may not be unneceſſarily expoſed to the hazard of loſing their efficacy: but if it ſhould begin to rain, or the ſucceeding day be a Sunday, no more aſhes ſhould be ſpread than can be ſowed and ploughed immediately. Theſe two circumſtances excepted, it will be right to ſpread over night what is to be ploughed in next morning; for I have experienced, that the little nipping froſts in this advanced ſeaſon, will often be ſtrong enough to freeze the aſhes and bits of turf not thoroughly conſumed, ſo as to render them unfit for ſpreading, till the ſun has thawed them; by which means a morning's work might, without this precaution, be loſt.

When the ſeed is ſown and covered, drains ſhould be cut with the ſame plough, either directly acroſs the furrows, or in an oblique direction to them, according as the declivity of the ground may require, in ſuch manner that they may empty themſelves into the main ſurrounding ditches, to carry off the water, eſpecially in the winter. Some of the men employed in breaking the clods will eaſily deepen theſe drains, to whatever degree you may think proper, with an inſtrument ſhaped like a hoe, with a ſtrong flat iron ſpike, about fifteen or ſixteen inches long, on each ſide of it. This inſtrument is very uſeful, and even neceſſary, upon ſeveral occaſions; nor is there any better for ſtirring the ground. It will likewiſe ſerve to complete the breaking up of ſuch parts of the ſpots where the furnaces ſtood, as may not have been ſufficiently cut by the plough; and to finiſh the imperfect ends of the furrows, next the head-lands, where the plough could not reach, and where the grain would be otherwiſe expoſed to the air and birds.

Though the ſpirit and warmth of the ſalts contained in the aſhes, will ſoon render this corn more forward than any other; yet as there will not be among it either graſs, weeds, or wild productions of any kind, the ſeeds of all theſe having been deſtroyed by the action of the fire, it will appear thin during part of the winter: but on the approach of ſpring, it will ſhoot up, ſpread, and tiller, ſo as often to become too thick at laſt. It always ripens about a fortnight ſooner than any other corn in the country; and the fineſt, as already obſerved, is conſtantly found on the ſpots where the furnaces were erected; the effect of the fire having been greater, and penetrated deeper in thoſe than in any other places.

As all our riches, as before obſerved, conſiſt in the aſhes, the more there is of them, the more the ground thus broken up will be fertilized. But all kinds of ſoil do not afford an equal quantity of aſhes when burnt; for though the burning be performed with ever ſo much care, repeated experience for ſome time paſt has taught me, that only ſome of the earth and ſtones, according to their quality, are reduced into lime, or calcined, by the operation of the fire, and that other parts of them will run into glaſs. The ſoils that calcine moſt are undoubtedly beſt, and yield the largeſt produce of aſhes; while thoſe, on the contrary, which burn to a glaſſy ſubſtance, are the worſt, and give the feweſt aſhes. Of this kind is ſand; and indeed, we may judge with certainty of any ſoil intended to be improved by burn-baking, by previouſly making trials on different parts of it. If the owner cannot go thither himſelf he may order ſome of the turfs cut with a depth of four or five inches of earth, to be brought to him, in order to their being dried and burnt. He may alſo have, in the ſame manner, in bags of paper, properly numbered, ſamples of the ſoil, or of the ſtones underneath, at every ſix inches from the ſurface, to the depth of eight or ten feet. Theſe ſamples may be eaſily procured by means of the borer, already deſcribed under that article.

If the perſon who makes theſe trials be not provided with a borer, holes may be dug. They will not coſt much, and he will be thereby enabled to judge what grain, trees, or other productions, each ſoil is beſt adapted to. I have often practiſed this method with ſucceſs, for improvements which lay at ſuch a diſtance that I could not immediately inſpect them myſelf: but as the judging of lands in this manner, without actually inſpecting them, requires great attention and long practice, the ſureſt method therefore is to examine them on the ſpot, and there make the neceſſary experiments. The furnaces which are the moſt burnt, or thoſe which burn the faſteſt, are not the beſt; for the aſhes are there too much calcined, and their quantity reduced.

I have often ſeen much finer corn grow in places where the uppermoſt turfs of the heaps, which had burnt ſlowly, were only calcined, and remained ſo nearly entire, that it was neceſſary to break them before the ground could be ſowed, than in thoſe places where the furnaces, after being entirely burnt, were totally converted into aſhes. In general, thoſe heaps which produce white aſhes, after they are burnt, are the leaſt valuable, and commonly yield the ſmalleſt quantity. This denotes a greater degree of vitrification than of calci-

nation.

nation. In proportion as the aſhes are yellowiſh, brown, or blackiſh, which laſt indicates the greateſt perfection, they are better in quality, and generally more in quantity. According as theſe different colours appear, the calcination exceeds the vitrification. I have dwelt the longer upon theſe different operations of the fire in the burning of land, becauſe they are of great importance to thoſe who break up ground in this manner, and no writers have hitherto given a ſufficient diſtinct account of them, for want of having had the neceſſary experience.

I muſt farther obſerve, that no land ought to be pared again too ſoon after it has been burnt; becauſe its turf being deſtitute of a proper covering, would not take fire well, as I have experienced. It will be neceſſary to wait till the heath or broom has ſhot up ſufficiently, which ſeldom happens in leſs than about two years. The dangerous practice of ſome country people, who frequently ſet fire to their heaths in the ſpring, under pretence of bringing up graſs for cattle, is ſo contrary to the right method of improving land, by burn-baking, that it always retards, and ſometimes abſolutely prevents the execution of this far more beneficial method; eſpecially if thoſe burnings have been too often repeated.

In countries where it is not the cuſtom to plough in ridges, but either in broad lands, or quite flat, in order to ſow afterwards with the barrow, I think it would, however, be right, to ſow the ground thus broken up, at leaſt the firſt year, under furrow, with the two-finned plough already mentioned; after which the uſual method of the country may be followed, if it be found the moſt proper. I adviſe this as the beſt practice, and am ſatisfied that none will have cauſe to repent the trial. It will ſave the greater part of the expence of ploughing; and the aſhes being leſs expoſed to the action of the air, will the more ſtrongly retain their fertilizing power. But, if, notwithſtanding theſe reaſons, the common practice of the country ſhould be ſtill preferred, even in the firſt year, the huſbandman, in this caſe, ſhould begin to ſpread his aſhes in the manner before directed, about Midſummer; as ſoon as the furnaces are cooled, without leaving any in the places where thoſe furnaces ſtood. Immediately after, a ſlight ploughing, juſt ſufficient to bury the aſhes, ſhould be given, with the precautions before-mentioned with regard to the furrows. No more aſhes ſhould be ſpread at any one time, than the plough can cover in the ſame day. A few days after this firſt ſlight ploughing, a ſecond ſhould be given, ſomewhat deeper, in the ſame direction, and theſe ploughings ſhould be continued, each going a little deeper than the former, till the ground be looſened to a ſufficient depth. Two good croſs ploughings will then be of excellent ſervice: after which a fifth ploughing a-croſs them, will bring them up to the direction they were in at firſt. The ground ſhould be harrowed ſeveral times between all theſe ploughings, with harrows heavy in proportion to the ſtrength of the ſoil; and if any hard clods have reſiſted the force of the harrow, women and children ſhould be employed to break them, it being neceſſary to pulverize the ſoil as much as poſſible. I ſay as much as poſſible, becauſe that cannot be perfectly compleated this firſt year. Perhaps the ſpiky roller would be of excellent ſervice here.

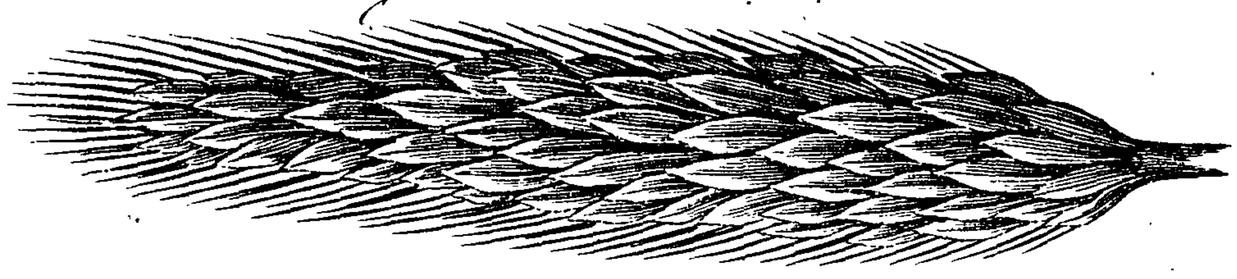
The ſame women and children will alſo clear away all the ſtones, if there be occaſion. Each ſucceſſive ploughing will turn the ſtones upon the ſurface; but ſuch only as are bigger than a man's fiſt need be removed. If any of the ſtones ſhould be too large for the women and children to remove, the carters muſt take them up as they paſs by; and if there ſhould chance to be any under ground ſo large that the men cannot move or load them, they muſt be broke with ſledge-hammers, and other iron tools proper for this work; or, if they are great rocks, they muſt be blown up with gun-powder; for nothing ſhould ſtop the progreſs of this undertaking.

The time to ſow the land thus broken up for the firſt time, will always be a fortnight later than the common time of ſowing other lands in the ſame country, with the ſame kind of grain. A few days before this is ſowed, it ſhould have another light ploughing; after which it ſhould be ſowed, in proper weather, with half the uſual quantity of ſeed, whether wheat or rye, and this ſeed ſhould be covered in, either with the plough, or with the harrow. Drains ſhould alſo be cut in this land, in the manner directed under that article, as ſoon as poſſible, to carry off the water in the winter. If any very large clods are left on the ground, women and children ſhould be employed to break them. This land being thus ſowed, nothing more need be done to it till harveſt.

The quality of the land muſt determine what ſort of grain will be moſt proper for the firſt year's ſowing in this huſbandry. If the ſoil be rich, it will bear wheat: if of a middling quality, it will produce meſlin, or a mixture of rye and wheat, conſiſting of a greater or leſſer proportion of either, according to the nature of the ground; and if it inclines to poorneſs, it will produce rye. Theſe particulars may be judged of immediately after the burning. In general, unleſs the ſoil be very excellent, I would always adviſe the ſowing of rye the firſt year. There will be a certainty of ſucceſs with that grain; and the huſbandman will be enabled by its produce, and by the ploughings, to judge what his land will be capable of doing the next year without running any hazard. This has been my method. I have alſo experienced, that rye does much better than wheat in all light ſandy ſoils thus broken up. When they are afterwards enriched to a certain degree, they become fit to bear meſlin, and then wheat: though if they ſhould never produce any thing but rye, the difference would not be great in point of profit.

As ſoon as the ground is cleared, a light ploughing ſhould be given it, to bury the ſtubble; and ſome days after it ſhould have a ſecond ploughing ſomewhat deeper, but in the ſame direction. When this is done, two good croſs-ploughings ſhould cut the ſoil to the proper depth for ſowing; and a fifth ploughing, afterwards to be given, will leave the furrows in their firſt direction. Between theſe five ploughings, which are to be performed with the plough having only one fin to the ſhare, the ground ſhould be well harrowed ſeveral times, and the ſtones and roots picked out. All theſe ploughings and harrowings will pulverize the earth, and mix it equally with the aſhes. If this land is to remain in ridges, the above will be ſufficient till the ſixth ploughing, which ſhould be given it a few days before the ſowing, and ſhould be followed by the laſt, performed with the two-finned plough to bury the ſeed: but if it be to be ſowed in broad lands, or quite flat, the former directions in that reſpect are to be obſerved here. In whatever manner any of theſe new grounds, broken up with the plough, are ſown, they will not require near ſo many

Fig. 1. an ear of Summer barley in its natural size. raised by Sir St. Plat. 1594.



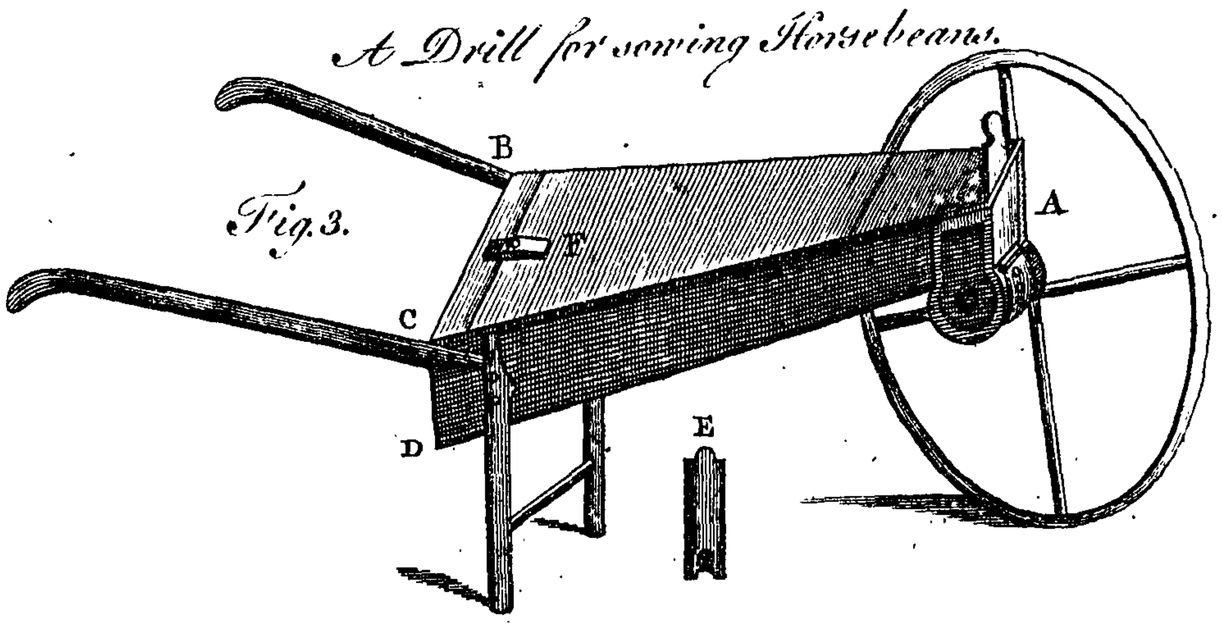
Bastard Alkanet.

Fig. 2.



A Drill for sowing Horsebeans.

Fig. 3.



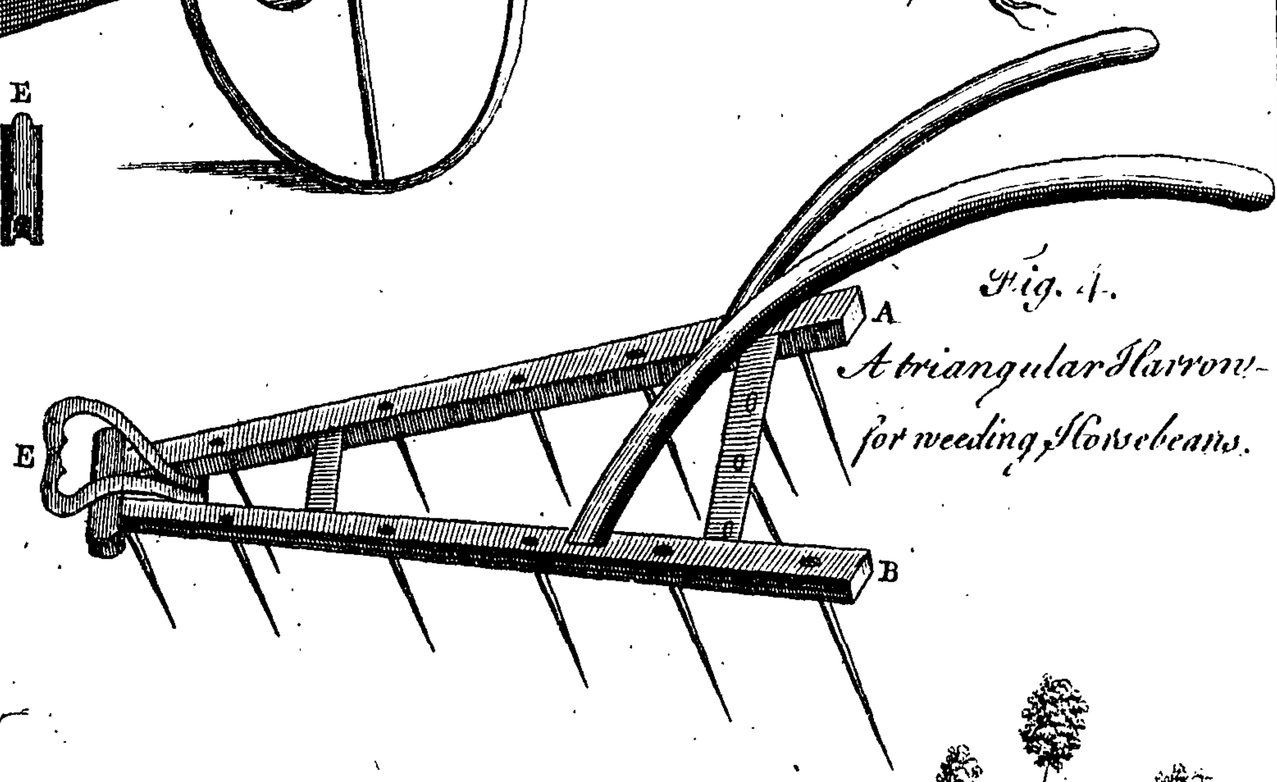


Fig. 4.
A triangular Harrow for weeding Horsebeans.

Fig. 5.

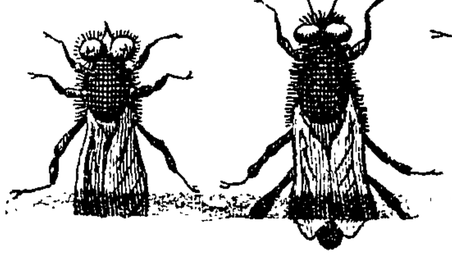


Fig. 6.

Fig. 7.



Fig. 9.

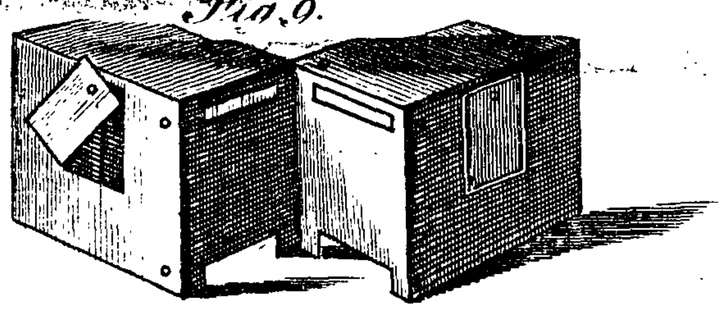


Fig. 12.



Fig. 8.

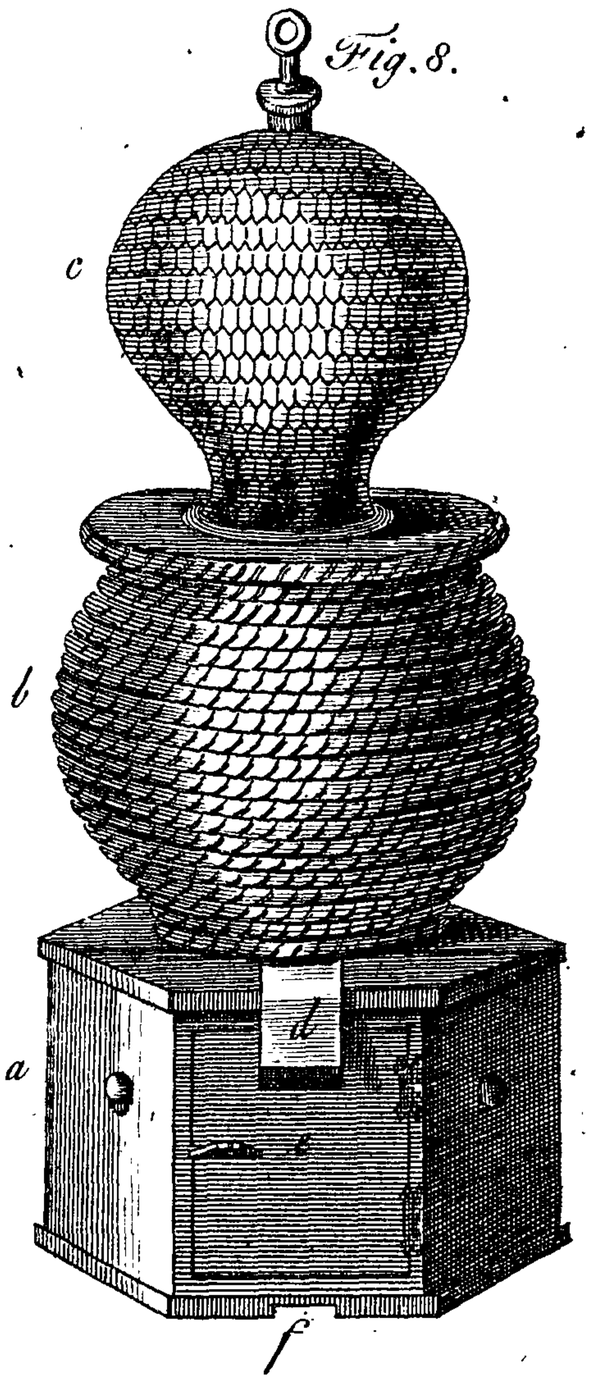


Fig. 10.

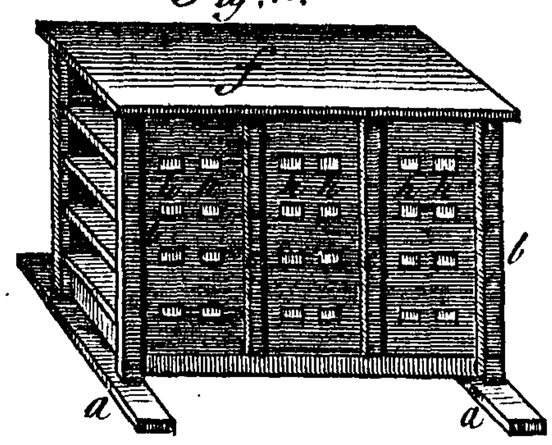


Fig. 11.

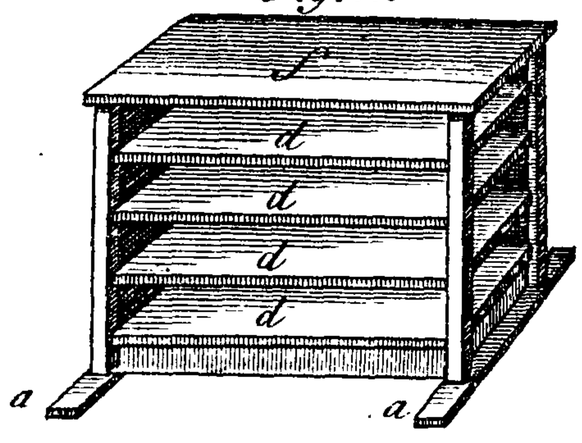


Fig. 11.

Rocque's Burnet.

Bent Grass.

J. Hulett Sculp.

many hands to break the clods this ſecond year, as were neceſſary in the firſt. With regard to the quantity of ſeed, a little more may be ſown now, that is, about a third part leſs than is commonly uſed in the country, of the ſame kind of grain, for an equal extent of land.

The lands thus brought into tillage by means of burning, become infinitely better than other grounds, and produce much greater crops. This proceſs improves the ſoil for upwards of twenty years. No weeds will ſpring up among the corn for a conſiderable time; for there are ſcarcely any, even now, in the lands I firſt broke up. The vegetable food in the earth is not therefore waſted here upon uſeleſs plants, but ſerves intirely to nouriſh the corn, which accordingly ſhoots with redoubled vigour, produces well-filled ears, without the trouble and expence of weeding it; and, when threſhed, is ſo clean, that it needs only to be winnowed. The bread made of it is excellent, and of a ſuperior quality. When in proceſs of time theſe burnt-lands ſhall produce as many weeds as other ploughed grounds, they will then be in the ſame degree of imperfection; but it will be a long while before that happens; even longer than I can ſay; for I have not yet ſeen an inſtance of it. The remedy, however, is always ſure and ready, namely, to let them reſt two or three years, by which time they will have acquired a new ſward, thick enough to be pared off, and burnt as before. This will reſtore them to their former perfection, without being near ſo expenſive as the firſt paring and burning: for there will be no roots to grub up here, nor any ſtones to carry off; nor will it be ſo difficult to break the now much fewer clods. I have managed in this manner with great ſucceſs, where there has been a ſufficient depth of mould, lands which had formerly been in tillage, and would no longer produce corn becauſe they were exhauſted, either by too many ſucceſſive crops, or too great quantities of weeds. They are now as good as any other burned land.

Worn-out meadows, which I have reſtored by the ſame means, and formed a-new with graſs-ſeeds, have yielded great quantities of excellent hay. I have collected plenty of this ſeed during ſome of the preceding years, from meadows which were not too wet. Several of my neighbours have practiſed the ſame method with equal ſucceſs: and, in a word, it is the moſt powerful reſtorative for worn-out land.

From what has been ſaid, it evidently follows, that the paring and burning of the ſurface of the earth, is, indiſputably, the beſt and ſureſt way, either to clear, or reſtore the ſoil. It is making a moſt advantageous acquiſition to one's own eſtate, the value of which is at leaſt doubled, and oftentimes quadrupled by this means. To enrich one's ſelf, without doing it at the expence of any perſon whatever, and, at the ſame time, to enrich the ſtate, is ſurely an action worthy of a true patriot, and of a reſpectable father of a family. This may be done by following the method here laid down; a method which has been long known, though very ſuperficially. I will venture to ſay, that it never was carried to the degree of perfection to which my practice has brought it; doubtleſs becauſe none applied themſelves particularly to it. *Memoire ſur les Defrichemens.*

A correſpondent of the editors of the *Muſeum Ruſticum* has given us the following method of performing this operation in the fens of Bedfordſhire.

About the middle of May, ſays this gentleman, we plough the land for burning, which is ſward-land, that has not been ploughed for four or five years, or perhaps a longer time: our ploughs are what are called Dutch ploughs, with a large ſhare; the edge and point are very thin and ſharp, and are kept ſo by filing: the furrows ſhould not be more than ſeven or eight inches wide, and an inch and a half thick, having as few baulks as poſſible. When it has lain ſo long that the ſods or furrows are dry (in which the farmer's own diſcretion muſt guide him, it being impoſſible to point that out by words) it muſt be made into heaps about the ſize of middling graſs-cocks, each perſon carrying on before him as heaps about ſeven furrows: the work will then direct him how big the heaps ſhould be; they ſhould be made as narrow at top as conveniently they can, by way of prevention againſt wet weather. If every perſon keeps his work as to the number of furrows, the heaps will riſe in regular rows; but it ſhould be obſerved to keep theſe rows in quincunx order (as repreſented on Plate II. Fig. 7.) that when you come to ſpread the aſhes, they may cover the ground regularly.

When it is fit for heaping, the cuſtomary way of this country is to let the burning out to people, to burn and ſpread the aſhes, which muſt be ſpread ſo as to cover the ground all over: the uſual price is from four to five ſhillings per acre; but that, in a great meaſure, depends upon the dryneſs or wetneſs of the ſeaſon. It would, however, I think, be moſt adviſable. where hands are plenty, to do this work by the day, as you may then employ as many perſons as you think fit; for it ſhould be burnt off with all poſſible expedition, becauſe if it be long in burning, it is attended with bad conſequence, which in rainy weather is hard to prevent: it is therefore very requiſite to purſue the work briſkly, otherwiſe the graſs-roots which lie below the reach of the plough, when ploughed for burning, will ſhoot out, and become almoſt as full of graſs, as though it had not been ploughed at all: then, when you plough it after the burning, inſtead of breaking ſo that the ſeed may fall into the cracks, it will turn up as ſtrait as clay, and then no ſeed can grow any where but in the ſeams between each furrow.

When one ſide of the field is cleared, and the aſhes ſpread, you muſt, as ſoon as there is room, get to ploughing and ſowing the ſeed. Nor muſt the furrows now be wider than thoſe already mentioned, and about two inches deep; for as fen land in general ploughs tough, rather than breaks, you will have more ſeams than if the furrows were made wider: the cuſtom with us is to ſow the ſeed as ſoon as poſſible after the land is ploughed. *Muſeum Ruſticum, vol.* I. *p.* 420.

BURNET, the Engliſh name of a plant, now greatly cultivated as a green food for cattle in the winter. We have given a figure of this plant taken from a ſpecimen gathered in a field belonging to Mr. Rocque at Walham-green, on Plate III. Fig. 12.

It is very natural to think that we have in England many ſorts of graſſes, which are well adapted to the climate, are wholeſome food for cattle, and, with the aſſiſtance of proper culture, would produce very advantageous crops both to the grazier and farmer. We have, for many years, been ſenſible of the great advantages that reſult from the culture of ſaintfoin: in ſome ſoils lucern has been ſown with conſiderable profit, and the Dutch trefoil is known to be excellent, when properly managed: but theſe only ſerve for green fodder in ſummer: they may, indeed, be dried, and made into hay, and in that form be reſerved for the cattle's food in winter; but this, independent of the inconvenience, trouble, and uncertainty, that attend the making

and keeping it in proper order is not ſufficient; the farmer has alſo occaſion for green fodder in the winter, and early in the ſpring, and that on many accounts, particularly for feeding ſuch of his ewes as will yean early in the year, as well as keeping them from loſing their fleſh after they have dropped their lambs.

A plant therefore which will not only live through the winter, but will alſo, if poſſible, vegetate in that ſeaſon, cannot fail of being highly advantageous, provided it be at the ſame time a pleaſing and nouriſhing food for cattle. All theſe properties have been lately found in burnet; it not only preſerves its verdure during the hardeſt froſts of our winters, but alſo increaſes in bulk, and grows, if the weather be all open and mild; and is now known to be an excellent food for cattle. The diſcovery is owing to Mr. Rocque of Walham-green, who, at the requeſt of the late Mr. Wyche, ſpent ſome years in endeavouring to find a plant that would prove an uſeful and ſucculent food for cattle during the winter; and, at laſt, fortunately diſcovered that burnet would anſwer the intention.

Mr. Rocque has alſo found by experience, that it will grow in the drieſt land: for he has planted ſome of it even in the gravel walks in his garden, where every thing elſe is burnt up in the ſummer, but this never withers; one of the qualities of burnet being to continue in ſap all the year. It is the opinion of many, who have ſeen the burnet of his raiſing, that if this plant is generally cultivated, there will never be a ſcarcity of hay in England, even in the greateſt drought.

The land, on which it is ſown, ſhould be fine, becauſe it is apt to ſhed, and it ſhould afterwards be dried perfectly.

Burner does not loſe its leaves in drying; and though the hay made of it be ſticky, it will, after threſhing, be very agreeable to horſes, which are ſo fond of it, that they never waſte any. One acre will produce upwards of three loads of hay, and above forty buſhels of ſeeds. Horſes are fonder of this ſeed than they are of oats: and Mr. Rocque is of opinion, that it is a more proper food for thoſe who do not labour hard, becauſe it is not of ſo hot a nature. Burnet bears ſeed twice a year, and will afterwards yield a good ſpring crop.

It is not only good for horſes, but alſo for all manner of cattle, even for ſwine: and Mr. Rocque has experienced another virtue in it, which is, that, being ſtung by a waſp, the leaves of this plant rubbed pretty hard upon that part ſo injured, immediately took off the inflammation.

If the burnet does not grow equally every where, ſome plants muſt be drawn where they are too thick, and planted where they are thinneſt: or the vacant ſpaces may be ſupplied from the nurſery. If the land was not got in good order to ſow the ſeeds at a proper ſeaſon, the burnet may be tranſplanted at Michaelmas from this nurſery, and ſet at nine or twelve inches diſtance every way, according to the richneſs of the ſoil.

The ſeed ſown in May may be mowed at the latter end of July. That ſown in June will yield a pretty good crop, and muſt be cut but once; and the ſame of that which is ſown in July. The plants produced by ſeeds ſown in Auguſt ſhould be mowed, to deſtroy the weeds. Theſe mowings may either be given green to horſes, or made into hay. The firſt ſpring cutting will purge horſes; and Mr. Rocque believes it will alſo cure the greaſe: but it is only the firſt crop that purges.

Burnet ſhould be mowed but once the firſt year, in order to leave it rank in the winter; and in this caſe it will be ready to feed in February or March, or to mow again in April.

If natural graſs grows among the burnet, it may be harrowed in the ſame manner as lucern; for having a tap-root, the harrow will not hurt it: but it muſt not be ploughed, leſt the roots ſhould be broken in the ground.

When the ſeeds of this plant are to be ſaved, it muſt neither be fed, nor mowed, in the ſpring. The ſeed will be ripe about the middle of June, when it muſt be reaped like wheat, and threſhed on a cloth. It ſhould be threſhed before it is too dry, becauſe it is apt to ſhed, and it ſhould afterwards be perfectly dried.

As a great deal has been written on the ſubject of burnet, we ſhall endeavour to ſet the whole in a fair light, by adding two letters which have been ſent from gentlemen of known character and reputation, to Dr. Templeman, ſecretary to the Society of Arts, Manufactures, and Commerce. The firſt is from Davies Lamb, Eſq; and was ſent in conſequence of a letter ſent that a gentleman by a member of the ſociety, requeſting his opinion with regard to the uſefulneſs of burnet.

"My burnet, ſays Mr. Lambe, though very green and beautiful all the winter, made no great progreſs till the middle of April following, when I thought it abſolutely neceſſary to feed it. I did ſo, but I did it too late, and kept my cattle upon it too long, from the middle of April to the 20th of May. This was a very great miſtake; the burnet plants were now headed for ſeed, and the flock chiefly fed upon the heads, which greatly leſſened my quantity of ſeed, as well as retarded the growth of the plants. I turned into the field, ewes, lambs, and calves, and they all fed very greedily upon the burnet. From what I had heard of Mr. Rocque, I very much expected them to ſcour, but there was not the leaſt appearance of it, and the cattle throve accordingly.

The 6th of July I began to mow, the weather being favourable; ſix men and four boys threſhed and cleaned the ſeed in ſeven days. I had 200 buſhels of very fine clean ſeed, as many ſacks of chaff, and ſeven loads of hay, from a field of ſeven acres and a quarter.

Satisfied that 200 buſhels of ſeed would be more than I ſhould be able to diſpoſe of, I was not anxious after another crop, being rather deſirous of ſeeing what it would perform as a paſture. Accordingly, in about ten or twelve days after the field was cleared, I turned into it ſeven cows, two calves, and two horſes; they all throve very remarkably, and the cows gave more, and we thought a richer milk than in any other paſture; I really expected (as burnet is ſo ſtrong an aromatic) that the milk would have had a particular taſte; but far otherwiſe: the milk, cream, and butter, were as fine, if not finer taſted, than any from the beſt meadows. I am ſatisfied, that there is no better paſture for cows, whether milch or barren, than burnet. The weather was now extremely droughty, all our paſtures were burnt up, yet the burnet flouriſhed, and grew away, as if it had a ſhower every week. My ſtock of cows, horſes, and calves before-mentioned, paſtured in it almoſt continually, till Michaelmas; by the middle of November it was grown ſo conſiderably, that I have again turned in ſix head of cattle, and if the weather is not ſevere, I am of opinion, it will maintain them till Chriſtmas.

The burnet ſtraw, or haum, is, after the ſeed is ſeparated from it, a very uſeful fodder for horſes, cows, calves, and

and ſheep; the chaff is of good value, if mixed with any other, however ordinary chaff. I have fed all the above-mentioned ſtock with it promiſcuouſly together in one field; putting the haum into racks, and the chaff into troughs, and if the haum was chopped with an engine, it would ſtill be of much more value.

Burnet, I am fully perſuaded, will prove a very great acquiſition to huſbandry on many accounts, but more particularly for the following reaſons:

Burnet is a good winter paſture, conſequently it will be of great ſervice to the farmer as a conſtant crop he may depend upon, and that without any expence for ſeed or tillage, after the firſt ſowing: whereas turneps are precarious and expenſive, and when they fail, as particularly this year, the farmer is very often put to great inconveniencies to keep his ſtock.

It affords both corn and hay too. Burnet-ſeed is ſaid to be as good as oats for horſes. I know they will eat it very well; judge then the value of an acre of land, which gives you at two mowings ten quarters of corn and three loads of hay.

The ſeed indeed is too valuable to be put to that uſe at preſent; though it multiplies ſo faſt, that I doubt not but in a few years the horſes will be fed with it.

It will bear paſturing with ſheep.

It makes good butter.

It never blows or hoves cattle.

It will flouriſh upon poor light ſandy, ſtony, ſhaltery, or chalky land.

Burnet, after the firſt year, will weed itſelf, and be kept clean at little or no expence.

The cultivation of burnet is neither hazardous nor expenſive: if the land is prepared as is generally done for a crop of turneps, there is no danger of any miſcarriage; and any perſon may be ſupplied with the beſt ſeed at ſixpence per pound, by Mr. Charles Thorp, ſeedſman, in the White-hart-inn-yard, Borough.

I make no doubt but that burnet might be ſown late in the ſpring, with oats or barley. A gentleman in my neighbourhood did ſo laſt ſummer, and it ſucceeded very well. I ſhould think a buck-wheat ſeaſon, which is ſown the laſt of all corn, would ſuit it very well; but of this I have no experience, and could wiſh to have the experiment tried. A pea-field, drilled in rows, and kept clean, would make an excellent ſeaſon for burnet, as the pea-crop would come off ſoon enough to prepare the land with two ploughings by the middle of Auguſt, after which time I ſhould not chuſe to ſow it.

It very frequently happens, that every farmer who ſows many acres with turneps, has ſeveral worth little or nothing; the fly, the dolphin, the black caterpillar, the dry weather, or ſome unknown cauſe, often defeating the induſtry and expence of the moſt ſkilful farmer. When this happens, as it too often does, I would by all means adviſe him to ſow it with burnet, and in March and April following, he will have a fine paſture for his ſheep and lambs.

Burnet is a native of England, and will certainly perfect its ſeed twice in one ſummer; and a farmer, with a ſmall plantation, may ſupply himſelf with ſeed of his own growth at very little or no expence: he may then be encouraged to make experiments in various ſeaſons, without much loſs or damage.

Thus, Sir, I have ſent you a true account of the ſucceſs of my burnet, and alſo my opinion of it. I wiſh what I have ſaid may any ways contribute to diſpel the prejudice, or inform the ignorance of my countrymen."

The other letter is from Chriſtopher Baldwin, Eſq; of Batterſea, a gentleman well known, and juſtly reſpected for his candor and fidelity.

In the years 1763 and 1764, ſays Mr. Baldwin, I made ſeveral experiments on burnet, with a view to make myſelf acquainted with its manner of vegetating, and the uſes to which it might be applied: and having by this means acquired that knowledge I was deſirous of attaining, I determined laſt year to lay down ſeveral acres with burnet; nor would I content myſelf with doing it in any one particular method: therefore in the beginning of July, 1764, I ſowed about eight rod of ground with five pounds of Rocque's burnet ſeed. Rain falling ſoon after the ſeed was ſown, the plants came up very finely, and throve in ſuch a manner, that I was tempted to plough up about an acre of ground and plant it that autumn, in order to ſee what effect the winter would have on the young plants. Accordingly on the fourth of October I planted them in rows, about twenty inches apart, and about fifteen inches from each other in the rows. This diſtance, from experiments and obſervations which I have made, ſeems to me a very proper diſtance. Theſe plants took very well, and through the winter throve with ſurpriſing vigour. Laſt ſpring I ploughed the remainder of the field, being three acres, and planted it in the ſame manner with my plants, the whole of which, notwithſtanding the uncommon drought of laſt ſummer, grew well, and the verdure of the plants was really very beautiful. No water was uſed; indeed it would have been a vaſt work in a field of that ſize: however, I never ſaw any need of it. The plants were once hoed, and ſtood over for ſeed, of which the quantity collected was not very great; but this muſt be attributed to the uncommon drought, for I think we had not above one ſhower of rain from the planting to the gathering of the ſeed, the whole of which amounted to about 160 pounds.

The ſeed being got, I was impatient to ſee how the cattle would take to it, as it was roundly aſſerted by ſome gentlemen, that no cattle would eat it. Accordingly I ordered four cows and two horſes to be turned into the field; the cows fed freely upon it, but the horſes did not ſeem to like it ſo much at firſt, though in two or three days they fed well upon it. Burnet has ſtrongly the taſte of cucumbers, and I was fearful it might give a diſagreeable taſte to the milk; it therefore gave me great pleaſure to find, in about four or five days, that the quantity of milk was not only much increaſed, but the flavour of the cream much ſuperior to any I had ever had before, or ever taſted from cows fed upon the richeſt meadows. The cows and horſes having fed down the field, it was hoed again, and then harrowed once over, which laid it very clean, nor could I find that the burnet was at all hurt by the harrow.

Here let me obſerve to you, that I fed my horſes in the ſtables for about five weeks with the burnet ſtraw, or rather haum, from which the ſeed had been threſhed. Theſe horſes fed very freely, and throve much upon it, though they had only half their uſual allowance of oats. However, as I would by no means ſecrete any circumſtance that may appear unfavourable to burnet, ſo I muſt tell you that I obſerved, when any friend called upon

me, and their horſes were put into the ſtable, that ſome horſes eat very greedily of it, and others would not touch it. I cannot ſay this gave me much concern. I ſatisfied myſelf with thinking, that ſome horſes did not know what was good for them; or to ſpeak more ſeriouſly, I thought the novelty of the food might as much diſpleaſe one horſe, as it pleaſed another; and doctor Templeman knows, that there are ſome things which we loath as children, that we are fond of as men; and that there are ſome things which we as much diſlike as men that are very wholeſome food: but to come nearer to the point. It is well known ſome ſheep and cows will not touch a turnep, yet is any one weak enough to infer from thence, that turneps are an unwholeſome or an improper food for cattle? And I was lately told by a particular friend, that he had often obſerved, when his horſes had fed for ſome time on the ſainfoin hay, that it was ſome days before they would again take to meadow hay. I ſhould not have mentioned this circumſtance of the horſes, but to ſhew my impartiality; and I do it the more readily, as I find there are ſome gentlemen who are as fond of decrying, as others can be of promoting uſeful experiments in agriculture.

Being well pleaſed with the ſucceſs that had attended my firſt experiments in the field, which I call four acres, I determined to proceed as I had intended in the ſpring of the year; accordingly as ſoon as the oats were got off a field of twelve acres, I ordered it to be ploughed and ſown with 160 pounds of burnet-ſeed beforementioned. This field was ſown on the twenty-ſixth of Auguſt laſt; and no rain falling till the eighteenth of September, the plants did not appear till the twenty-eighth of that month: however, there ſeems to be a good crop, and I intend as ſoon as they freſh up in the ſpring, to have the plants ſet out with ſmall hoes (ſuch as are uſed for carrots and onions) to about ſix inches apart. And in about a week after this is done, I ſhall harrow it with light harrows; for from experiments which I have made, this ſeems to me to be the beſt method of managing broad-caſt burnet. Having nothing farther to ſay in regard to theſe twelve acres, I muſt return to the four acre field tranſplanted, which having been hoed and harrowed as before-mentioned, was laid up for winter food for my cows; but finding lately ſome gentlemen had again aſſerted, that ſheep in particular would ſooner feed on the quick-hedges than touch the burnet, I ſent to a neighbouring farmer for his flock of ſheep, and having a friend with me, we followed the ſheep into the field, who fell upon the burnet ſo greedily, that we found it very neceſſary to ſend them home again.

Being much vexed at theſe idle tales told about ſo much to the prejudice of this (as it appears to me) excellent plant, I determined to put it to as fair a trial as I poſſibly could. Accordingly, I ordered in four cows, which were in a very good feed on natural graſs, and had beſides a large truſs of oat-ſtraw put in their cribs, every night, notwithſtanding which they gave very little milk, and indeed were almoſt dry. Theſe cows, I declare, had not been in the burnet above ſix days, before they gave much more than double the quantity of milk; nay was I to ſay three times the quantity, I know I ſhould not exceed the truth. The milk is exceeding fine, and free from all bad taſte: and further I muſt obſerve, that they ſoon began to leave half their ſtraw in their cribs; ſo that they are now ſerved with only half the quantity they had before. My land is a poor dry upland gravel; there are millions of acres in this kingdom of better land that do not fetch two ſhillings and ſixpence an acre. What a field therefore is here for improvement? Nay, I cannot but obſerve with amazement, the great numbers of country gentlemen who daily flock to this great city in purſuit of trifles, when they have ſuch inexhauſtible funds of knowledge within themſelves, if they would properly make uſe of them: confident I am, I could point out methods of improvement that would ſurpriſingly better their eſtates.

As the account I have now given you of burnet may appear a little extraordinary to ſome of the worthy members of your ſociety, ſo I ſhall be far from being diſpleaſed at their even doubting what I have now ſaid: on the contrary, it will give me pleaſure, provided any gentlemen, who have ſuch doubts, will do me the favour to call at my houſe, and convince himſelf by ocular demonſtration of what I have now ſaid."

BURNING *of heath*, a common practice of the country people for clearing heathy ground, in order to procure graſs and herbage for their cattle.

The fitteſt time for burning commons is towards the latter end of the ſummer, when the plants are withered. But great care muſt be taken that the fire extends no farther than is intended.

This care conſiſts chiefly in clearing away all the graſs, &c. on the ſide you would preſerve from the flames, to a diſtance ſufficient to prevent all communication. The graſs, &c. cut down there ſhould be ſpread upon the part intended to be burnt, which will ſerve to kindle the fire after it is dry.

Beſides this precaution, a fair, calm day muſt be choſen; when by kindling the fire on the ſide the wind blows from, you prevent its ſpreading any further that way, and ſee it gradually remove up into the heath or common. The fire ſhould be carefully watched for fear of accidents. But if notwithſtanding theſe precautions, it ſhould ſpread to places intended to be preſerved, and no water ſhould be at hand, the moſt effectual way of ſtopping the progreſs of the fire, is to dig a trench: for by throwing up the earth on the ſide where the fire is, you cover the graſs, and thereby hinder the flames from extending any further.

BURNING *of land*. *See the article* BURN-BAKING.

BURNS, are accidents that often happen to animal bodies, whereby a ſolution of the continuity of the parts is produced.

In burns and ſcalds, when the ſkin remains entire, let the part be bathed well, and kept wrapped up in rags dipped in ſpirit of wine camphorated. Salt bound thick on the part has alſo been found very effectual for this purpoſe. Indeed all ſaline and ſpirituous applications excel all others, while the ſkin is yet unbroke; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſallad oil, and a plaiſter ſpread with bees-wax and oil. If the ſkin be ſo ſcorched, that ſloughs muſt be digeſted out, dreſs the wound with the wound-ointment and oil of turpentine, and finiſh the cure with any drying ointment.

The fire ſuppoſed to be left in the part after injuries of this kind, is nothing more than the inflammation, which is the natural effect of ſuch cauſes: ſo that the whimſical notions and conceits concerning fire remaining in the part, is extremely abſurd. *Bartlet's Farriery, p.* 251.

BURNT-CLAY, a manure proper for close compact soils, which it opens, warms, and invigorates, and thereby disposes such lands to part with their vegetative virtues.

A correspondent of the editors of the *Museum Rusticum*, tells us, that he has experienced the efficacy of this manure on wet, cold land; and gives the following method of preparing it.

"I caused, says he, a labourer to dig as much clay as made a number of walls nine inches high, the same in thickness, and placed at the same distance from each other, in the same parallel direction, forming a square of about three yards. These vacancies, being like tunnels of brick kilns, I filled with brush-wood, and on that threw some cinders or small coal, of which I had sufficient quantities, living then near some collieries; after which I covered the whole square with clay about three inches thick, leaving the ends of the tunnels open, which I then lighted on the windward side: as soon as the fire had got sufficient head, I stopped the mouths of them; and when I perceived the covering was almost burnt through, I had a small sprinkling of cinders or small coal thrown on the heap, and then another covering of clay of the same thickness; and thus I went on till my fire was seven or eight feet high.

"When I found my fire was very well kindled, which was commonly about the time I put my second coat on, I used to enlarge the base of the fire, by continuing the tunnels, and by adding new ones to the sides (which were filled and covered as the others, and then lighted) till I made my fire about seven yards square; for I soon found it never burnt well in the middle, if it was too large at first.

"Care should be taken that the labourer does not put on too thick a coat at once, as it will be apt to smother the fire: besides, by confining the heat in too much, the clay was apt to run and vitrify, which was then of little use.

"As soon as the heap was sufficiently cool (for the sooner it is laid on the land the better) I put about ten large cart-loads on a statute acre, and found it an admirable manure for either meadow, pasture, or corn; for the latter it will not last longer than three crops, though longer for the two former: and with this I have made prodigious improvements; but I do not believe it will answer for a sandy soil, as it will render it still lighter.

"This manure I burnt all times of the year, though slower in the winter than summer, but always fastest in windy weather.

"This I fancy may be burnt with brush-wood, or furze only; which I apprehend will answer better between the coats than coal, as it will keep the clay more open." *Museum Rust. vol.* I. *p.* 407.

BURNT-*grain*, a distemper common to corn, and too often confounded with smut, though it is, in fact, very different, and much more dangerous.

The smut, properly so called, occasions the total loss of the distempered ears; but as the black dust is very fine, and the particles of it have no cohesion, the wind and rain carry it off so that scarcely any thing is housed in the barn, &c.

The burnt-grain is, on the contrary, often laid in the granary with that which is sound, to which it communicates a contagious distemper, and also darkens the flour, and gives it a bad smell.

The characters of this distemper are, 1. The plants that produce burnt ears are strong and vigorous.

2. The infected ears are not at first distinguishable from those that are healthy; but when they are past their bloom, they appear of a deep green colour, approaching to blue; they afterwards become whitish, and are then easily known. As this change of colour is effected by the sun, when a number of white ears have been suddenly perceived in looking over a wheat-field, the sun's heat has been often thought to cause this distemper, or a fog preceding that heat.

3. Though all the ears produced from one grain are commonly infected, yet M. Tillet, Aimen, and myself, have met with sound ears on plants that had produced others which were infected. We have even found some ears, part of which only were vitiated, and finally some grains enclosing partly a white flour, the remainder black dust.

4. In burnt ears, the chaff, or outward coat, was commonly sound, with this single difference, that when the ears were near ripe, it appeared more withered and dry than in the healthy ears.

5. The bran, which immediately enclosed the grain, is not destroyed, as it is in the smut, properly so called; but has consistence enough for the grain to preserve nearly its natural form, with a whitish look.

6. The burnt grains are shorter, rounder and lighter than such as are uninfected: they are sometimes larger, sometimes smaller. The furrow which runs the length of a grain of wheat is sometimes totally effaced, at others is visible: the pistils at the extremity of the grains are dried up.

7. The bud of burnt-grains is not visible.

8. Till the blooming season, there is very little difference betwixt the burnt-grain and that which is healthy: they are only a little more swelled. But in the blooming season, the infected ears assume a bluish colour; the chaff is more or less specked with small white spots: the grains are of a deeper green, and larger than a state of nature; and, as long as they preserve that colour, they adhere strongly to the chaff. The distemper has often attacked very young ears, while yet enclosed in the sheath. The stamina on the sides of the grain are then dried up and sickly; the embrio in part takes the deep green colour above-mentioned; the infected ears have not the consistence of those that are healthy; in the same measure the distemper advances, the chaff becomes dry and whitish.

9. The grains have some degree of firmness. On opening them, which may easily be done with the nail, there appears an unctuous, dark, brown, stinking substance, not at all resembling the light dust of smutty ears; the dust of burnt-grain has some cohesion, and through a microscope appears to consist of larger particles than that of the smutty ears.

10. Some time before the blooming season, the grains appear to be filled with a whitish substance, a little burnt towards the bottom, and this colour extends by degrees over the whole ear: the grain then appears divided, as it were, into equal quarters by furrows; which disappear as the grain increases in size.

11. By what has been said, it is evident that smut infects corn much sooner than the burnt-grain.

12. Grains that are much burnt are evidently incapable of sprouting. But I have had some sound grains taken

from an ear greatly burnt, which, in a kitchen-garden, have produced very ſtrong plants; and though the birds diſturbed my experiment, it appeared to me that there were ſome ſound ears among many more that were infected.

13. A part of the burnt-grain is bruiſed by the flail, and their black duſt is ſcattered over the ſound grain; this unctuous duſt chiefly ſticks to the hairy extremity of the grain near the bud; it there forms a black ſpot. Corn ſo affected, is called *ſpotted grain*: many of the grains which eſcape the flail remain entire, on account of their lightneſs; a great deal is ſeparated by throwing, but the ſpotted grain remains as well as many that are burnt; and this is enough to darken the flour, and give it a bad taſte.

14. To remedy this inconvenience, and make the beſt bread, they paſs the corn through drum-ſieves (*cribles a tambour*) made of pierced iron-plates, like the graters with which they raſp tobacco; the corn is then waſhed, and all the light grains that ſwim ſkimmed off, which are moſtly burnt. The water takes off the ſpots, which are but ſuperficial; for if a ſpotted grain is wiped, the ſpot immediately diſappears.

With reſpect to the cauſe of this diſtemper, I confeſs we are hitherto as much at a loſs as in the caſe of ſmut. Some have attributed it to dung; others to fogs; many to the heat of the ſun; ſome to inſects; others to the moiſture of the land; and not a few to the ſeed not being ripe: but theſe opinions are confuted by good obſervations, and by experiments very carefully made. We refer to what has been ſaid of ſmut.

It may ſeem improbable that a mere ſuperficial duſt, that only ſticks to the bran, without penetrating the grain, ſhould be ſo contagious as to infect all the grain it touches, with a diſtemper; what is more ſurpriſing is, that it ſhould injure the organs of fructification only. Yet, however improbable this may appear, the experiments made by Monſ. Tillet put it paſt a doubt; they ſhew that the farmers are not without reaſon cautious in avoiding to ſow ſpotted grain.

As it would take up too much room to mention, at large, all the experiments made by M. Tillet, which are to be found in the papers publiſhed by him on that ſubject, I ſhall content myſelf with relating the reſult of theſe experiments, and the inferences this able naturaliſt draws from them.

Several writers having mentioned dung as the immediate cauſe of this diſtemper, and others having aſſerted that it was hereditary, all M. Tillet's experiments were calculated to clear up theſe two points: he was at the ſame time in hopes, by means of the ſame experiments, of finding ſome method of guarding againſt this terrible diſtemper.

1. The ſeveral kinds of dung had no viſible effect in producing burnt-grain. The infected ſeed produced as much burnt-grain in the ground that was not dunged as in that which was. He did not find that dung had any effect, either in favour of, or againſt the diſtemper.

2. Dung made of the ſtraw of infected grain, did not ſeem to communicate the diſtemper; but the infected ſtraw unrotted ſeemed to communicate it. Yet the effect was moſt viſible when the duſt of burnt ears was mixed with the earth.

3. All grain naturally ſpotted, whether it grew on the land, or was brought from another place, bearded-wheat, ſummer-wheat, and wheat without awns, produced a great deal of burnt-grain.

4. Picked wheat taken from the fineſt ears, and carefully ſelected grain by grain, that none of it might be infected, being ſowed, ſome in dunged, and the reſt in undunged beds, without having received any preparation, yielded little or no burnt-grain.

5. Some of this ſame picked wheat being ſprinkled with the duſt of burnt-grain, produced as many diſtempered ears as that which was naturally ſpotted.

6. The picked wheat, being prepared with lime and a ſolution of the ſea-ſalt, yielded ſtill fewer infected ears than when unprepared.

7. There were ſtill fewer from what was prepared with lime and nitre.

8 Early or late ſowing ſeemed to be a matter of indifference.

9. It appears by M. Tillet's experiments, ſeveral times repeated, that the duſt of burnt ears is contagious, ſince ſound wheat ſprinkled with it, or ſowed in rills in which that duſt had been put, produced a great number of infected ears. He alſo found that this duſt, though expoſed to a ſtrong heat, as of ſixty degrees, is ſtill contagious, unleſs it is abſolutely burnt by the fire, when it has not that effect. Though it is kept for years, its infectious quality continues as ſtrong as ever.

10. Some farmers waſh the ſacks in which they put their ſeed. And it appears by M. Tillet's experiments, that they are in the right; for if the ſacks had any of the duſt on them, it would certainly infect ſome of the ſeed-corn.

11. M. Tillet thinks he has obſerved, that the infected plants are more ſuſceptible of injury from froſt than others.

If this is the caſe, hard froſts muſt be ſerviceable, ſince by deſtroying the infected plants, they would have the ame effect, as if ſuch plants had been all pulled up. The land being cleared of theſe uſeleſs plants, would be better able to ſupply ſuch as are found with nouriſhment, and the crop would be exempted from infected ears, which are a great hurt to it.

12. The black duſt ſo contagious, is not ſo to rye or bere; but the duſt of darnel is pernicious to wheat.

13. Smyrna wheat is leſs ſubject to this diſtemper than other grain; but ſummer wheat is greatly injured by it.

It muſt be allowed that the knowledge which has been acquired of the cauſe of this diſtemper, has put the curious obſervers in a train of finding proper preſervatives. In fact, as the duſt of burnt-grain infects all the grain it touches, it is probable that every method ſhould be deemed efficacious, that is capable of taking away this duſt, provided the virus has not from its firſt contact affected the interior part of the ſeed intended to be ſowed. In this caſe the ſeveral ſieves which we have recommended to be uſed in the preſervation of corn, and the waſhings with fair water, which in many places is uſed on ſpotted grain, may be mentioned as efficacious preſervatives, as well as lime-water which our farmers uſe, the ſtrong brine uſed in ſome provinces of France, and the ſolution of arſenic, of which ſome perſons have made ſuch a ſecret: all theſe preparations ſhould be of ſervice; and, according to M. Tillet's experiments, they are ſo: yet they are often inſufficient. This point, therefore, merited to be cleared up by particular experiment, and with all neceſſary care. M. Tillet ſet about it with ſpirit, and the following are the inferences that may be drawn.

1. The

1. The effect of the black duſt on the ſeed is only ſuperficial till it is put into the earth, not at all affecting the interior parts.

2. Therefore every means that can tend to clear them of the duſt, muſt be of ſervice to keep them healthy, and free from the diſtemper.

3. Grain perfectly free from this, and from rottenneſs will yield no diſtempered plants.

4. Grain blackened with this infectious duſt, may be made healthy by clearing it of ſuch duſt.

5. Sifting ſeed, and waſhing it in ſeveral waters, leſſen, it is true, the effects of the contagion; but this is not ſufficient, as many infected plants will be produced, tho' the ſeed was waſhed in ſeveral waters.

6 Lime, which is more efficacious than water, is not always enough ſo. I ſhall obſerve, on this occaſion, that ſeed was formerly limed in a manner different from what it is now. The ſeed was then put into baſkets, which were plunged into lime-water very hot. The ſeed was ſtirred in the baſkets, and all that ſwam on the water was taken out with a cullender; by this means they got rid of the infected grain; and the good ſeed was better cleaned, than by only throwing, as they do now, lime-water on a heap of ſeed, which is then ſtirred with a ſhovel, or by only mixing the ſeed with the ſlacked lime reduced to powder.

One of our farmers, a careful man, being obliged one year to ſow ſpotted ſeed, he limed it by immerſion, in the manner above deſcribed; and the year following had no burnt-grain.

Some experiments made in the county of Caux, by M. de Goufreville, have been publiſhed; they evince the good effects of lime uſed in the manner we have mentioned. And what is ſtill a farther confirmation of this is, that whenever our farmers ſow ſeed that has not been limed, their fields are amazingly infected.

7. It is a good precaution to waſh ſpotted grain in ſeveral waters; but it ſhould be ſoaked in brine, and this brine ſhould be abſorbed by lime, by immerſion, as we have deſcribed.

8. A ſtrong brine of ſea-ſalt is very good, and may be employed to great advantage in countries where ſalt is a merchandize.

9. One part of nitre to nine parts water is more efficacious than ſea-ſalt; this, therefore, ſhould be uſed where nitrous earths abound.

10 Strong alkaline lyes are ſtill better; ſalt-wort, pot-aſh, aſhes or tartar, lyes of common aſhes much impregnated with ſalt and human urine, or cows urine, alkaliſed by putrefaction: of theſe various articles ſuch may be choſen as are moſt common. For inſtance, in Normandy aſhes of ſea-wrack, which are very cheap there, may be uſed. This, which is rejected for dying and lyes, as being more impregnated than alkaline with ſea-ſalt, may be advantageouſly uſed in the preparation of ſeed.

11. As it is evident that ſeed picked with care yields very few infected grains, it muſt, of courſe, where a farmer has ſpotted grain, be of great advantage to him to change his ſeed, in order to procure what is uninfected.

12. M. Tillet's proceſs may be comprehended in what follows: if the ſeed is ſpotted, it ſhould firſt be waſhed in ſeveral clear waters, till the black is quite got off; it ſhould then be put into the ſteep. If it is not ſpotted, ſoaking it in the following liquor will be enough. Make ſome lye, ſuch as is uſed for linen, in a bucking-tub, putting four pounds of water to every pound of aſhes. If one hundred pounds of aſhes are uſed and four hundred pounds of water, there will be two hundred and forty pounds of lye, to which muſt be added fifteen pounds of lime, which will be enough to prepare ſixty French buſhels of wheat (between ſixteen and ſeventeen buſhels Engliſh meaſure). When this ſteep is to be uſed, it muſt be heated as hot as you can bear your hand in it; the ſeed, being put into baſkets, muſt be plunged into it, and ſtirred with a ſtick; the baſkets muſt then be raiſed and kept up by ſticks on the edge of the bucking-tub for the lye to drain; the ſeed being thus prepared muſt be laid on the floor of the granary till it is dry enough to ſow. If it is prepared long before it is wanted, it muſt be, from time to time, ſtirred with a ſhovel to prevent its heating; with this precaution it may be kept a month, or even a whole year.

We prepared ſome ſeed in this manner at M. Taponat's, near Rochefoucault in 1760; and in 1761 we ſaw with pleaſure that the corn ſo prepared was uninfected; whilſt in the neighbouring fields, a fourth, a third, and even half the crops were ſpoiled by this diſtemper.

All the trials that have been made evince that acrid ſubſtances are proper remedies for this diſtemper: I alſo believe all the ſteeps to be good; but prefer M. Tillet's, as being more acrid, and leaſt coſtly. I imagine lye that had been uſed for linen might do, only ſtrengthening it with ſome ſea-wrack, and putting twice as much lime. I know this lye to be very acrid, but cannot anſwer for its efficacy in preſerving corn from being burnt, becauſe for ſeveral years paſt we have ſcarcely had any of our grain ſo infected.

13. Several farmers in different provinces have uſed a ſolution of arſenic to prepare their ſeeds. Great complaints have been made in all quarters of it. Among others, a phyſician publiſhed an Eſſay to ſhew of how much importance it was to prohibit the uſe of this poiſonous ſteep. He there enumerates all the accidents that have happened to the ſowers, and to the men that made the preparation, of which himſelf was a witneſs. Since M. Tillet has given us a method ſimple and innocent in itſelf, but little coſtly, and of great efficacy to clean ſpotted grain, it is to be preſumed that no body will uſe this pernicious drug, from which ſuch melancholy conſequences may enſue, if by accident any of it ſhould be mixed with the meal, and if the light corn is given to the poultry or cattle; beſides, this poiſoned ſeed muſt kill all the partridges and pigeons that eat the uncovered grain.

As ſome people are fond of making objections, it may, perhaps, be urged, that if the black duſt was ſo infectious, this diſtemper would make from year to year ſuch progreſs, that in the end we ſhould have nothing but burnt-grain. But we need not be apprehenſive in this reſpect; and a year in which much corn is infected, ſucceeds one in which ſcarcely any burnt-grain was to be met with. Scarcely any was to be found in the crops of 1754, 1760, and 1761.

In reflecting on this objection, which has ſome weight, I think I have found an anſwer to it in M. Tillet's obſervations, which is, that hard winters, paſt all doubt killing the diſtempered plants, ſtop its progreſs.

It may alſo be ſaid, that if this diſtemper is only cauſed by the infectious duſt, how can it at firſt get footing in a province that was before unacquainted with it?

It is readily allowed that this diſtemper may be attributed to other cauſes beſides the black duſt: but M. Tillet's experiments inconteſtably prove this duſt to be contagious: and his reſearches ſupply us with the means of leſſening conſiderably, if not entirely extirpating this diſtemper: thus we may have larger crops, better bread, and corn more proper for keeping. What a ſatisfaction muſt it be to a man to have made a diſcovery ſo uſeful to his fellow-creatures, whoſe chief food is the ſeveral ſorts of grain! we ſhall ſoon ſee whether habit, ſupineneſs, and ill-judged œconomy in the farmers, will not prevent them from reaping any benefit from M. Tillet's labours, who yet propoſes to them ſimple and cheap methods of attaining an end which to them ought to be of infinite conſequence. *Du Hamel's Elemens d'Agriculture, vol.* I. *p.* 134.

BUR-TREE, a name given in ſome counties to the elder-tree.

BUSHEL, a meaſure of capacity for dry things, as grain, fruits, pulſe, &c. containing four pecks, or eight gallons, or ſixteen quarts.

A buſhel, according to a ſtatute made in the twelfth year of Henry VIII. is to contain 2,178 cubic inches, or eight gallons of wheat; the gallon of wheat to weigh eight pounds troy-weight. Mr. Ray tells us, that a buſhel in Warwickſhire is equal to two ſtrikes, or two buſhels, ſtatute, or Wincheſter meaſure.

The French buſhel conſiſts of four quarters, and the quarter of four litrons, each containing thirty-ſix cubic inches. Conſequently the buſhel contains 576 French cubic inches, which, according to Mr. Greaves's calculation, is nearly equal to 615 Engliſh inches. The French buſhel therefore is to the Engliſh buſhel, as 615 is to 2,171. That is, the French buſhel contains one peck, a quart, and two cubic inches nearly. It muſt however be obſerved, that the French buſhel for oats is double that of any other grain.

BUTCHERS-BROOM, or knee-holly, the name of a plant common in woods in divers parts of England.

BUTTER, a fat unctuous ſubſtance, prepared, or rather ſeparated, from the milk by churning it. *See the article* DAIRY.

BUTTER-BUR, or *peſtilent-wort*, the name of a weed reſembling colt's-foot in many reſpects; but the flowers are purple, and grow in a thirſe. The leaves come out after the flowers decay; and are like thoſe of colt's-foot in ſhape; but three or four times as big. It infeſts meadows and paſture grounds, where it proves a very troubleſome weed. *See the article* COLT'S-FOOT.

BUTTER-FLY, the name of a numerous, and well known claſs of inſects.

M. Du Hamel has frequently noticed, and made drawings of a ſpecies of ſmall inſects, ſome of a bright red, and others black, which are found in great numbers in the ears of wheat. He ſuſpected that they fed on a ſweetiſh juice which is in the ear whilſt green: and M. Tillet, who was immediately of opinion that they might do conſiderable damage to the grain, followed them very arduouſly in all their metamorphoſes, of which he has given a full account in a memoire that gained the prize of the Academy of Bourdeaux for the year 1755.

The inhabitants of a conſiderable part of the province of Angoumois have, for thirty years paſt, ſuſtained an hitherto irreparable loſs, by an inſect which begins to devour their corn, even in the ear, before it is reaped. This ſcourge deprives them annually of their moſt promiſing crops. It appeared at firſt only in a few hamlets, but ſoon made a rapid progreſs, and has now ſpread to the lands of upwards of two hundred pariſhes. Famine and the moſt fatal epidemic diſeaſes have often taken riſe from leſs beginnings. Meſſieurs Duhamel and Tillet were deputed by the Academy of Sciences at Paris, of which they are members, to enquire into the nature of this inſect, and the means of preventing and curing that dreadful calamity occaſioned thereby. They have jointly publiſhed a ſmall treatiſe on this ſubject, from whence we ſhall extract the following remarks ſo much the more readily, as their means of prevention and cure in this particular caſe may be equally applicable to the injuries done to corn by inſects in general.

This inſect is moſt generally known as a butterfly, very much like the moth which preys upon woollen cloths, or the falſe moth, which is found in great quantities in the granaries of all countries, and which feeds on corn. M. de Reaumur, whoſe accurate inquiries into nature nothing could eſcape, has minutely deſcribed both theſe inſects.

The butterflies which proceed from the wheat caterpillar are often ſmaller than the falſe moth. Some of them are, however, larger, and longer ſhaped: but, that excepted, they are much like them: they are likewiſe of the claſs of four-winged phalenæ or night butterflies; their wings are long in proportion to their breadth, which is almoſt equal at the upper and the lower end. The colour of the upper wings varies; being ſometimes of a light, and ſometimes of a darkiſh grey brown, but always ſhining when expoſed to the ſun. The poſition of theſe wings, of which the edges are cloſe ſet with long hairs, is horizontal when the inſect firſt ſettles after having flown; but ſoon after thoſe edges incline downward. Its head (Plate V. Fig, 24, 25, 26.) is furniſhed with two antennæ (Fig. 27.) the joints of which, nicely fitted into each other, leſſen gradually up to the point. Its eyes are almoſt as large as thoſe of the falſe moth. Between the antennæ are two beards, (Fig. 28.) which proceed from the lower part of the head, and riſe up above it; and likewiſe between the antennæ is a tuft of hairs, which turn up backward.

Theſe inſects do not take any food while they are in the ſtate of butterflies, as will be proved by ſeveral experiments; nor do, or indeed can they, prey upon and deſtroy corn during that time, as is the general, but miſtaken opinion in Angoumois; for they have not even organs capable of doing it the leaſt injury. Their only function then is to procreate their ſpecies.

The males of theſe butterflies ſeem, in general, to be larger than the females: but they cannot well be diſtinguiſhed with certainty, unleſs they are ſeen coupled together, which, according to the very nice and careful obſervations of Meſſ. Duhamel and Tillet, never is but in the night-time, or in a dark place. Their copulation then is like that of the ſilk-worm butterfly: the body of the male and that of the female then form one ſtrait line; their heads are turned different ways; the ends of their wings reſt upon each other; and their conjunction

laſts ſeverals hours. The abovementioned gentlemen with many other witneſſes, ſaw great numbers of them in this ſituation, both upon heaps of corn in granaries, and upon ears of corn in the field. They catched two of them in the act of copulation, and put them into a glaſs covered over, where they then ſeparated, but were found joined together again the next day, in the evening.

As ſoon as the female is impregnated, ſhe lays her eggs in great numbers. Meſſieurs Duhamel and Tillet put a male and female, coupled, into a glaſs veſſel, and, watching them carefully, ſaw the female, ſoon after her ſeparation from the male, depoſit her eggs, ſometimes on one ſpot and then on another, in heaps of 60, 80, or 90 together. Theſe eggs are ſquirted out, as it were, commonly by three, four, or half a dozen, and ſometimes thirty at once; and at each ſquirt of this kind the female changes her ſituation. Thoſe which were incloſed in glaſſes caſt ſome of their eggs upon a few grains of corn depoſited at the bottom of thoſe glaſſes, and, finding themſelves cramped there, laid others on the ſides of the veſſel. The eggs are accompanied with a viſcous matter, which makes them ſtick to the places they are laid in; and this coheſion ſoon becomes very ſtrong.

Theſe eggs, as may eaſily be imagined from the ſize of the mother and the great number which ſhe lays, are ſo extremely ſmall that one of them would drop through a hole made in a bit of paper with the point of the fineſt needle. When examined by a microſcope, they look, as in Fig. 4, not unlike the nymphs commonly called ants eggs. They are ſtreaked length-wiſe, and appear rough or curdled. When firſt laid, they are white; and afterwards they become red, as if tinged with carmine; owing to the colour of the caterpillar within the egg, of which the ſhell is very thin and tranſparent, as is evident after the caterpillar has left it.

By means of the thinneſs and tranſparency of this covering, the caterpillar may be ſeen within the egg, as at *b*, Fig. 5. At firſt, it is bent, as in Fig. 6: ſome time after, it wriggles itſelf into the ſituation repreſented in Fig. 7; and then makes a hole through the end of the egg, and comes out there, as in Fig. 8. This opening remains at the end of the empty eggs, as at *c*, in Fig. 5.

It is with great difficulty that the caterpillar gets its two legs out of the egg; but after he has extricated four or ſix of its legs, it ſoon draws out the reſt of its body. At its firſt iſſuing from the egg, this caterpillar looks like a bit of hair about a quarter of a fifth part of an inch long.

Theſe caterpillars generally come out of their eggs on the ſixth or ſeventh day after they have been laid. Some ſay they have ſeen them hatch at the end of four days. The temperature of the air will undoubtedly influence this variation. They are red, as was ſaid before, whilſt in the egg; but that colour goes off by degrees after they are hatched, and they ſoon become almoſt white.

The female butterflies which are upon the ears of corn n a field, endeavour to place themſelves in ſuch manner s to lay their eggs cloſe to the place where the grain is aſtened to the ſtalk. Fig. 1. repreſents ſome of them, t *a*, in the attitude of thus laying; in which caſe their ggs are depoſited near the bottom of the grains, toward ne ſtalk: but it often happens that, in their hurry to lay, they ſcatter their eggs in other places, as repreſented upon the huſks in Fig. 2 and 3.

As ſoon as the caterpillars are hatched, they ſet about making their way into the grain, in order to feed upon its flour. If the eggs have been laid in the granary, after harveſt, and upon the grains themſelves, they generally creep into the furrow *a* of the wheat (Fig. 9. and 10), and there weave a ſlight web *b*, *b*. They then tear a hole in the ſkin or rind, range round them the particles of the bran thus ſeparated, and wriggle themſelves into the mealy ſubſtance which is to be their food. The hole through which the caterpillar entered can then no longer be perceived, but by a little heap of bran which lies upon it, as in Fig. 11. This ſmall quantity of pulveriſed bran, which is a ſure ſign that a young caterpillar has got into the grain, may eaſily eſcape the notice of thoſe who have not obſerved it before; but when once known, it is eaſily diſtinguiſhed.

When the eggs are hatched upon the ears, in the field, the young caterpillars ſoon find means to glide in between the chaff and the grain, and in that ſituation they pierce the latter, as was ſaid before, generally in the furrow, but ſometimes at the pointed end, which is a little hairy.

To ſet this in a yet clearer light, it is to be obſerved, that, in moſt kinds of wheat, three grains of corn adhere, or are faſtened, at the ſame height, to the ſpike or ſtalk which traverſes the ear, as at *b*, *b*, *b*, Fig. 1. in ſuch manner as to form a ſort of triangle, or flower-de-luce. Each grain is covered with three concave coats or huſks, the ſmalleſt and thickeſt of which is repreſented by Fig. 2 and 3: their inner huſk is covered by a broader, but thinner; and this grain is covered by a ſtill larger, from which ariſes the beard, when there is one. Over all theſe there frequently is a fourth tegument, or very thin membrane, more or leſs wide. All theſe huſks lap over each other like the ſcales of a fiſh, and invelop the grain. Then end *e* (Fig. 9.) is uppermoſt, and the end *f*, reſts upon its ſupporter. The germ is at the end *f*, and the extremity *e* is covered with a hairy down.

The young caterpillar finds means to creep under all theſe ſcale-like coverings, and to get at the grain, which, after having wove a ſlight web of only a few fine threads, either to cover itſelf, or to hold by, it attacks, ſometimes at the upper end *e* (Fig, 9), which is very ſoft in green corn; and ſometimes, if it has crept in at the lower end, it lodges in the longitudinal furrow of the corn, and there begins to mine in the manner before related.

As the huſks of barley are harder, and ſtick much cloſer to the grain, than thoſe of wheat, it is almoſt always at the point *d* (Fig. 12.) that theſe caterpillars ſlip into that corn, by means of a ſmall opening generally perceptible in that part.

To conceive how theſe ſmall caterpillars, which are hardly able to pierce the rind or bran of wheat, can glide into barley by means of the opening before mentioned, it is neceſſary to conſider the organization of this grain. It is formed of two lobes *c*, *c*, Fig. 12. which are partly ſeparated by a furrow in its middle, and partly covered by a tegument *a a*, which ſits exactly cloſe and adheres ſtrongly to be lobes *c c*, and terminates in a long awn or beard *b*, of which only part is repreſented in this drawing. The two lobes *c c* are again covered with their proper tegument, which ends in two ſmall appendices at

d.

d. Here generally is a chaſm or opening, through which the caterpillar penetrates to the mealy ſubſtance.

To trace this caterpillar in its further progreſs after it had crept in at this opening, and conſequently diſappeared, Meſſieurs du Hamel and Tillet tore off the appendices *d*, Fig. 13, and found, that after having wove a ſlender web, it had immediately begun to attack the lobes of the grain of barley, as was evident from the bran around it. After it had made its way intirely into the grain, and was buried there, they ſaw nothing but the little heap of bran it had thrown up, over the hole through which it entered.

Notwithſtanding the induſtry of this inſect, it ſeems highly probable that the young one's meet with great difficulties in their attempts to get into the grain; ſince very many of them die before they can effect a lodgment in the mealy ſubſtance. This number is ſo great, that it might induce one to wonder how ſuch quantities of corn can be deſtroyed by theſe caterpillars, if one did not conſider the vaſt fecundity of the female butterflies. But the ſequel of this account will ſhew, that if prodigious numbers of them did not periſh, it would hardly be poſſible to ſave a ſingle grain of any kind of corn.

The people of Angoumois were ſtrongly of opinion, that the miſchief occaſioned by this inſect was peculiar to the corn of their country, and that what was brought to them from other places always eſcaped unhurt. To clear up this point, Meſſ. Duhamel and Tillet put into different glaſſes wheat of the growth of other provinces, and with the grains, in each glaſs, ſome of theſe butterfies actually coupled. They ſoon ſaw the female lay her eggs upon theſe grains, and afterwards beheld the caterpillars hatch, and make their way into the grains. Their farther obſervations proved, that the principal cauſe of the ſpreading of this evil is, that the inſect itſelf, which multiplies exceedingly, is conveyed to other parts with the corn in which it is incloſed.

The caterpillar incloſed in a grain of corn preys upon the mealy ſubſtance of that grain, till it has eaten it all; by which time the inſect has attained its full growth. Whenever a grain was opened (Fig. 19.) in which the caterpillar was not full grown, a deal of flour yet remained: but when this inſect was full grown, there remained only the ſkin, or bran, ſo deſtitute of flour, as not even to diſcolour clear water. Hogs, though very greedy creatures, and fond of bran, would not touch theſe hulls when given to them unmixed; but they eat them readily enough when mixed with other food.

M. de Réaumur ſuſpects that when theſe caterpillars have conſumed all the flour, they eat the excrements which they had voided whilſt young. At leaſt it is certain that, upon opening ſeveral grains in which the inſect was young, a number of ſmall white pellets, like eggs, was found near the caterpillar; and a half-grown caterpillar being taken out of a grain, and laid upon a piece of glaſs at the focus of a microſcope, it was ſeen to void a quantity of excrement, very white, ſmooth, and oval; and when the caterpillars were ready to be metamorphoſed in the ſpring, there remained only a very ſmall portion of dark brown excrements, quite different from the white that were obſerved at firſt.

The length of the corn-caterpillar, when full grown, is very little more than the twelfth part of an inch; and its thickneſs is, at moſt, equal to half the circumference of the grain that contains it: its body its ſmooth and entirely white; it is thickeſt towards the head, in which one may perceive its mouth, two large eyes, and two kinds of horn: the head is a little browner than the reſt of the body. This caterpillar has ſixteen legs, of which the eight intermediate and membranous are only ſmall prominencies, ſo minute as not to be diſtinguiſhed even with the help of a microſcope, unleſs the inſect be laid upon its ſide.

Our authors make here the following digreſſion, to ſhew the difference between this inſect (Fig. 23.) and the falſe moth (Fig. 31.); it being the more important to diſtinguiſh them, as they are very much alike in many reſpects, and often blended together in the ſame granaries.

The falſe moth proceeds from a ſmall caterpillar, the body of which is ſmooth and whitiſh. It has ſixteen legs, does not lodge in the grains of corn, but contrives to faſten ſeveral of them together with a web which it ſpins, and with which it makes itſelf a dwelling-place like that of common caterpillars. This dwelling-place, or ſheath, in which the caterpillar of the falſe moth uſually abides, is generally in the middle of the little heap of grains which it has collected for its food, as in Fig. 30: but what diſtinguiſhes it from the caterpillar of the true moth, it can quit this ſheath at any time, to eat the grains around it, one after another. It generally attacks ſeveral grains at once, and always without order, eating ſometimes of one, and ſometimes of another, ſo that ſeveral are gnawn when not one is wholly conſumed. When theſe inſects are very numerous in a granary, all the grains upon the ſurface of the corn are linked together by a web, ſo as to form a cruſt which is ſometimes three inches thick. This caterpillar turns into a chryſalis, or aurelia, in a grain which it has hollowed, or in the ſheath of its web, and iſſues from thence, in the month of June, in the form of a butterfly. When a heap of corn is ſtirred in which there are many caterpillers of the ſpecies of this falſe-moth, thoſe inſects crawl up the walls: but they ſoon return to the heap, and, by the very next day, cover it all over with a new web.

The inſect which deſolates many parts of Angoumois is more ſparing of the mealy ſubſtance of the corn, than the caterpillar of the falſe-moth; for the former ſeldom conſumes more than the contents of a ſingle grain. Nothing is more uncommon than for it to paſs from one grain to another, even though it be immediately contiguous. It eats the flour in ſuch manner that the ſkin or rind of the grain, which is entirely emptied, looks whole and ſound: but the leaſt preſſure then eaſily reduces it to powder; and it riſes up to the ſurface of water more or leſs quickly, according as the inſect has left in it more or leſs flour.

As heat haſtens the metamorphoſis of the inſect, it is not unuſual to find, in very hot weather, ſome of theſe caterpillars transformed into aureliæ, before they have conſumed the groſs excrements before-mentioned, or even eaten all the mealy ſubſtance of the grain. In this caſe, the aureliæ are very ſmall, and produce only ſmall butterflies. The ſame happens to other inſects of this kind. Silk-worms eat but little when they are ſickly, and, if that ſickneſs continues, they are metamorphoſed ſooner than others which are healthy; but then their cocons always are ſmall. If a field caterpillar be ſhut up

up in a box before it has attained its full growth, it will, after having faſted ſome days, be converted into a ſmall aurelia, from it will iſſue a butterfly ſmaller than others of the ſame ſpecies. In like manner, when one ſees among the corn caterpillars ſome larger than others, it may reaſonably be preſumed that this difference proceeds from their having been a greater quantity of flour in the grains on which they fed, than in thoſe which were the nouriſhment of ſmaller flies; or from their having been of a ſtronger conſtitution. It likewiſe appears that ſome of theſe caterpillars are ſo much more voracious than others, that the flour of one grain is not ſufficient for them. M. Duhamel put ſeveral of them into a box of flour: they throve there, and ſeemed to grow larger than in their common way of feeding in the grain.

In general, they are metamorphoſed much ſooner in ſummer and when the air is warm, than in winter, or in cold weather. It may likewiſe be obſerved, that the mealy ſubſtance of a grain is more completely conſumed when the metamorphoſis is ſlow, than when the contrary happens.

The ſagacity of M. de Réaumur was requiſite to diſcover a ſingular circumſtance relative to the working of this inſect, and of which Meſſ. Duhamel and Tillet have been witneſſes. The caterpillar, exactly incloſed in its grain, foreſees, or acts as if it knew, that, in its future ſtate of butterfly, it will be deprived of the organs neceſſary to pierce through the rind of bran which forms its priſon. However, whether it has or has not that foreſight, the fact is, that the caterpillar, before it is changed into an aurelia, makes in this covering of bran a ſmall trap *a* (Fig. 21.) which remains ſhut. Meſſrs. Duhamel and Tillet could not eaſily diſcover it at firſt; but after ſome ſearch, a little ſpot whiter than the reſt, about as big as the head of a ſmall pin, and ſomewhat prominent, ſhewed them where it was. They then, upon lifting up this trap (Fig. 22.) with the point of a fine needle, could ſee the chryſalis in the inſide of the grain, and could alſo, ſometimes, cloſe the trap again ſo exactly, as not to leave the leaſt appearance of a hole.

When the caterpillar has attained its full growth, and formed its trap, or outlet, it weaves a cocon, and is afterwards metamorphoſed, within the grain, into an aurelia (Fig. 20.) which ſeems at firſt to be divided by ringlets (Fig. 14.); but when the butterfly is formed within the aurelia, its wings may be diſcerned through the membranes which cover it, as in Fig. 15, 16, 17, 18. The above-mentioned accurate obſervers opened ſome of theſe aureliæ in an advanced ſtate, and took out of each of them a butterfly greatly rumpled and benumbed. When one of theſe caterpillars firſt iſſues out of an egg, and when a full grown one is taken out of a grain of corn, the body of each, then ſeemingly more at eaſe, dilates, ſo that one can hardly conceive how it could be contained in ſo ſmall a ſpace as that from whence it came. The caſe is different when one opens a grain in which there is an aurelia; for it is eaſily ſeen that this occupies little more than half of the inner capacity of the grain which incloſes it, and that the caterpillar, in forming a cocon, has divided the grain into two ſpaces or cells, in the largeſt of which, being ſomewhat more than half, the aurelia is lodged, whilſt one ſees in the other nothing but its excrements. The aureliæ are therefore ſmall in compariſon to the caterpillars that were metamorphoſed into them. Nor is it leſs ſurpriſing how a butterfly juſt come out of the aurelia could be contained within that covering.

The butterfly, being intirely formed in the aurelia, breaks the ſkin of it at the end, opens with its head the little trap which the caterpillar had made on the outſide of the grain, and comes out at the little hole which was covered and ſhut by that trap. The mealy ſubſtance of the grain has, by that time, been ſo far conſumed, and the outſide huſk or bran rendered thereby ſo light, that the butterfly, after having diſentangled its wings, takes its flight, and ſometimes carries away the empty hull. As ſoon as the butterflies are out of the grains which contained them, they couple, and the females lay their eggs in the manner before related. Such is the circle of their life.

This inſect, like all others of the ſame ſpecies, remains, as was ſaid before, a longer or ſhorter time in its different ſtates, according as the temperature of the air is more or leſs favourable to its ſeveral changes. It is known that an aurelia of a caterpillar, which generally produces a butterfly in eight days, will continue three months in the ſtate of an aurelia, if it be put into an ice-houſe, and that the butterfly does not, in that caſe, come out, till after it has been removed into a much warmer air. For this reaſon one cannot fix preciſely the time within which the caterpillars are transformed into aureliæ, nor how long they remain in this ſtate: it can only be ſaid, that they come out of their eggs very ſoon when the air is warm, and that they ſometimes continue long in the ſtate of caterpillars, as well as in that of aurelia, if the weather be cold: to which may be added, that both caterpillars and aureliæ, of different ſizes, are ſeen in the field in warm weather; that butterflies are ſeen to iſſue out of corn from harveſt till the end of September; and that caterpillars of various ſizes may be found in the infected grains, during the whole winter.

"In the middle of May 1761," continue Meſſieurs Duhamel and Tillet in their account of this inſect, "when we arrived at la Rochefoucault, there were many caterpillars in the corn, very few aureliæ, and not many butterflies. The weather was then very dry, and the nights were cold. On the 21ſt, the wind changed to the weſt; and in a few days after it began to rain, and continued ſo to do till the end of the month. During this time the thermometer was at from 13 to 14 degrees of Réaumur, or from 56 to 58 of Farenheit.

"In the beginning of June, we found in the grains of corn many more aureliæ than caterpillars; and on the 5th of that month, the air being then become pretty warm, we ſaw numbers of butterflies. By the 15th, they were increaſed ſo prodigiouſly in the cloſets where we made our experiments, that they perfectly darkened the day, and flew into our mouths if we opened them. We could then find but very few caterpillars, except in the corn which had been laid in cool places. We believe that the duration of the life of the butterflies is, in general, a fortnight or three weeks; though ſome of them have lived a month in our glaſs veſſels. The ſequel will ſhew that the whole circle of the life of this inſect may be completed in leſs than fifty days, when the air is warm.

"The coming out of the butterflies is generally denoted by a great heat in the heaps of corn, or in the

ſheaves, according as the grain is laid up in one or other. It was ſuch as to make the liquor in M. de Réaumur's thermometer riſe to 25 and 30 degrees (from 62 to 71 of Farenheit) when the outer air was at 15, (35 and a half of Farenheit). This heat certainly accelerates the hatching of the inſects; for prodigious multitudes of butterflies iſſue out of the heated corn in a few days after the ferment has taken place.

"The coolneſs of autumn interrupts their propagation; and no more butterflies appear from that time, till the warmth of ſpring begins to be felt. But, may not the heat, which favours the multiplication of theſe inſects, be produced by the creatures themſelves when aſſembled in vaſt numbers? This is very poſſible: for it is well known that there is a conſiderable warmth in well ſtocked bee-hives; and that corn greatly infeſted with weevils or moths, is alſo very hot. We ſhall hereafter have occaſion to obſerve that no ſenſible heat is perceived in heaps of grain in which there are but few caterpillars, and that the heat abates after moſt of the caterpillars have been changed into butterflies. It ſometimes happens that, through ſome cauſe or other, the heat goes off ſoon, and at other times it laſts three weeks or even a month. Perhaps too this great heat of corn full of caterpillars may proceed from the moiſture which thoſe inſects occaſion, and from thence may ariſe a fermentation capable of hatching the eggs, of making the caterpillars grow, of haſtening their transformations, and of bringing forth the butterflies, at the ſame time that it damages the corn, which thereby contracts a bad ſmell. It is certain, that when the harveſt is wet, and warm rains fall at that time, the corn heats very ſoon, and then theſe inſects make an extremely rapid progreſs. The heat which the corn contracts is doubtleſs very favourable to that progreſs, and the inſects certainly may then attack the grains ſoftened by the moiſture, more eaſily than they can thoſe which are hardened by drought. Accordingly, in 1760, a year in which the heat was great, and the air very dry, the corn in Anjou kept cool ſo long that many of the inhabitants of that province thought there would be but few inſects, and that the great heat of the ſun had killed moſt of the caterpillars. They flatter themſelves with the ſame hopes whenever theſe inſects do not appear in great numbers quite ſo ſoon as uſual, and imagine that few or none of them will come afterwards: but in that very year, which they thought ſo fatal to inſects, we ſaw butterflies come out of the ears of corn while they were in the reapers hands; we ſaw ſtill more fly about the ſheaves laid up in barns, and an inexpreſſible multitude upon the ſurface of corn depoſited in granaries, though neither of theſe grew very perceptibly till about the middle of September. In 1761, the corn was ſo much heated on the 8th of September, that though the outward air was of the ſame temperature as that in the vaults of the obſervatory at Paris, Réaumur's thermometer placed in one of thoſe heaps roſe to 53 degrees, (131 of Farenheit's). The great heats of the ſummer had therefore only deferred the evil, and perhaps leſſened it a little. But this dreadful ſcourge returns every year. Theſe caterpillars, incloſed in their grain of corn, and ſheltered in barns or granaries, are ſcreened from the viciſſitudes and rigour of the air which deſtroy other inſects that are expoſed to them.

"Let us now review our inſect in all the ſeaſons of the year, in order to try to find under what circumſtances it may be attacked with moſt advantage.

"At harveſt-time, we ſaw butterflies come out of ſome grains, which were already empty and entirely conſumed, before they were reaped. Doubtleſs theſe firſt butterflies couple and lay their eggs upon the other unreaped ears, and probably part of thoſe eggs are deſtroyed by the action of the flail, when the corn is threſhed and cleanſed ſoon after its being cut: but as the caterpillars are hatched very ſpeedily in hot weather, and many of them can, as in fact we ſaw them, enter into the corn that is reaping, and ſhelter themſelves there, they will do all their miſchief, if ſpeedy care be not taken to ſtifle them, as we ſhall hereafter obſerve.

"The reaped corn is laid up in ſheaves in barns, till the huſbandman can find time to threſh it, which is ſometimes ſooner, and ſometimes later. The corn thus piled up, heats; and the transformations of the inſects incloſed in it are then the ſooner effected. When any of theſe piles of ſheaves were ſtirred in our preſence, we ſaw butterflies come out of them, and the grains from which they iſſued were empty of flour, and abſolutely ſpoiled. The moment theſe butterflies are out of their priſon, they couple, and lay their eggs upon the ears which they find in the barn. Part of theſe eggs, and of the young caterpillars, might certainly be deſtroyed by the flail and winnow, as we ſaid before, if they were uſed ſpeedily.

"Many peaſants in the country we are ſpeaking of make all the haſte they can to threſh their little crops, which they generally do upon a very dirty floor made in a hurry in the open air. They winnow and cleanſe their corn as ſoon as it has been threſhed; and the empty grains are then partly ſeparated from thoſe that are full, by the wind, which carries the lighteſt away with the chaff.

"As the dirtineſs of the floor on which the ſheaves are threſhed fouls the grains of corn, theſe people waſh them, and thereby take off ſuch of the remaining light grains as ſwim upon the water. They likewiſe ſeparate the grains of which the caterpillars have eaten ſo much of the mealy ſubſtance as to render them ſpecifically lighter than the water: but the grains of which the caterpillars have not eaten much of the flour, ſink to the bottom with ſound ones; and the caterpillars devour thoſe infected grain after they are ſoftened by the water, much ſooner than thoſe which are thoroughly dry.

"Moſt of theſe peaſants, knowing the ill fate that will attend their corn, ſell it as ſoon as poſſible to dealers, who carry it into the neighbouring provinces, and with it the contagion. This is the real cauſe which ſpreads the evil. Others have their corn ground immediately after harveſt; and this is the beſt method they can take, though not without its inconveniencies: for, in the firſt place, there are not mills enough in the country to grind immediately the whole produce of the crop; ſecondly, the meal of corn gathered in a wet harveſt will not keep long; and laſtly, though the friction of the mill-ſtones undoubtedly deſtroys almoſt all the inſects, it is not certain but that ſome of them may eſcape; and in that caſe they will thrive, and go through their ſeveral metamorphoſes, firſt into aureliæ and afterwards into butterflies, in the flour, as we have experienced in the manner before related.

"Several

" Several of the inhabitants of the country in queſtion lay their corn up in granaries, in order therewith to pay their rent, which in general, is not due till the beginning of October. From theſe heaps of reſerved corn iſſue multitudes of butterflies, which, as we have obſerved, couple and lay upon that corn an immenſe quantity of eggs, from whence proceed caterpillars which get into the grains, and devour their inſide during the whole winter.

" It is highly probable that, in mild and moiſt autumns, ſome of the firſt hatched caterpillars may be changed into butterflies early enough to produce a ſecond generation before winter; nor will this ſeem ſurpriſing to thoſe who know how rapidly warm weather makes theſe inſects go through all their metamorphoſes. But, independent of this, it is certain that butterflies are continually ſeen to come out of all the heaps of wheat, barley, and rye, in Anjou, during the whole ſummer, and till the autumn begins to grow cold; that numbers of live caterpillars are found in the grains during the winter; that many aureliæ are found in them towards the end of May; and that prodigious multitudes of butterflies iſſue from them as ſoon as the weather begins to be hot, that is to ſay, towards the middle of June.

" Thus we ſee that there are, in a manner, two flights of butterflies; one which appears from harveſt time till the weather grows cold in September, and the other which appears in June, and laſts till harveſt. The former, in our opinion, proceed partly from granaries in which corn of the preceding year has been laid up with young caterpillars in it, and partly from the eggs firſt laid upon the ears, towards the end of May, or upon the new reaped corn; ſo that the ſecond flight begins juſt as the firſt flight ends.

" A circumſtance well worth obſerving, and which will be more particularly noticed hereafter, is that moſt of the butterflies of the ſummer flight remain in the granaries, faſt clung to the threſhed corn, upon which we have ſeen them couple and lay their eggs. It looks as if theſe butterflies knew that there then no longer is in the fields any corn fit to feed their poſterity. On the contrary, thoſe of the ſpring flight endeavour to get out of the granaries, and do in fact get out in vaſt number, through the windows, to ſpread in the fields, and lay their eggs upon the yet green corn."

That this is really the caſe, and that theſe inſects are of the ſpecies called *phalenæ*, appeared evidently from ſeveral very accurate obſervations, made by Meſſrs. Duhamel and Tillet, and of which it may be ſufficient to mention here only the following.

In June 1761, they went, at different hours of the day, into granaries where there were heaps of corn infected with theſe inſects. While the day laſted, they perceived a multitude of butterflies which ſtirred a little upon thoſe heaps, but did not quit them. When they returned into the ſame granaries a little after the ſun-ſet, they ſaw thoſe butterflies riſe from the corn, and fly to the walls, where they ſettled for a while; after which they took their flight in vaſt numbers, through the windows, and went off with ſuch rapidity that they ſoon got out of ſight. If Meſſrs. Duhamel and Tillet went back into theſe granaries at ten or eleven o'clock at night, they no longer ſaw ſo great a number of butterflies, and thoſe that did remain ſeemed to be leſs agitated.

To be ſtill more perfectly acquainted with ſome circumſtances of the life of this inſect, they put different ſort of corn into ſmall cloſets, in September 1760, after having paſted white paper all over the walls and ceiling. In the beginning of June 1761, theſe cloſets ſwarmed with butterflies, which ſeemed to be pretty quiet during the day, and were ſeen to be greatly agitated towards the ſetting of the ſun: but they could not get out of the cloſets, becauſe the windows were cloſely ſhut. On the 9th of June, towards eight o'clock in the evening, one of the cloſet doors being opened, a prodigious number of butterflies immediately iſſued out, and, with ſurpriſing ſwiftneſs, traverſed an oppoſite granary, without making the leaſt ſtop, though ſeveral heaps of wheat lay in it. They bent their courſe directly to an open window of the granary, at ſome diſtance from the cloſets, and inſtantly haſtened out. Several people, who were preſent, followed them with their eyes, till the ridge of a barn near forty feet off, and the decline of the day, prevented their ſeeing them any further. Our obſervers returned to the ſame cloſet at about ten o'clock at night, and then found the remaining butterflies very quiet, ſcarce one of them attempting to fly out.

Theſe obſervations prove ſufficiently that this ſpecies of butterflies is nocturnal, and that thoſe of the June flight have a different inſtinct from thoſe which do not appear till after harveſt. Theſe laſt remain upon the corn in the granary, and there couple and lay their eggs, from whence proceed caterpillars which penetrate into the grains as ſoon as they are hatched. The June caterpillars, on the contrary, act as if they knew that the bloſſoming of the corn is paſt, and that its ears are fitted to ſupply their poſterity with their neceſſary food. They ſeldom leave the granary before ſun-ſet, unleſs dark clouds chance to beguile them earlier, in which caſe numbers of them become the prey of ſwallows and martins, which fly about the windows.

As theſe little inſects fly very ſwiftly, and riſe to ſuch a height that the eye cannot follow them long, eſpecially when the duſk of the evening begins to come on, Meſſrs. Duhamel and Tillet were obliged to try ſeveral methods before they could be certain what became of them. The caterpillars which they found in the grains of ſtanding corn made them conclude that the butterflies, when out of the granary, flew directly unto the green corn, and laid their eggs upon its yet tender ears: but none of the country people, of whom they inquired, had ever obſerved them in the fields, or could give any ſatisfactory account of them. Another well atteſted circumſtance, which ſtrengthened their conjecture, was their being aſſured by perſons of undoubted credit, that the corn which grows neareſt to villages, farm-houſes, barns, or buildings uſed for granaries, is always much more damaged by inſects than that which grows at a diſtance from any habitation. Their own obſervations confirmed this fact; and their experiments, dictated by reaſon, ſoon proved that they had conjectured right.

Deſirous to know what was become of the ſwarms of butterflies which they had ſeen go out of the granaries in June 1761, they ſearched all the neighbouring fields of every kind of corn, and beat even the ſurrounding hedges, at all hours of the day, to no ſort of purpoſe: not a butterfly could they find, excepting a few dead and dried ones intangled in ſpiders webs along the out-

ſide of the corn. This very circumſtance led them to the diſcovery they were in queſt of: for, rightly reflecting that theſe inſects, which neither they nor any other perſons had been able to find in the fields in the day time, muſt certainly be of the *phalenæ* or nocturnal kind; they, without farther delay, ſet out with a candle and lanthorn, repaired to one of the corn fields which they had viſited in the afternoon, and, in the night between the 5th and 6th of June, ſoon deſcried a great number of the very butterflies they were ſeeking for, upon the beards of the ears of wheat. They returned to the ſame ſpot early the next morning, and could not then find a ſingle one.

From that time they ſaw and ſhewed to whoever choſe to ſee them, a great number of theſe butterflies upon the ſtanding wheat and barley. Some were upon the beards, and others had made their way to the point of the grain. Scarce an evening paſſed without their ſeeing ſome of them coupled. Though every circumſtance concurred to prove, and indeed left no room to doubt, that theſe butterflies were the ſame as thoſe which infeſted the corn in granaries; yet, to be throughly convinced, and to convince others, in this reſpect, they took ſome of them from off the ears of corn in the field, examined them with a microſcope, and found them to be of the very ſame ſpecies. A farther demonſtration of this reſulted from the following incidents. M. de Taponnat, one of their friends in Angoumois, had, in a ſmall granary, ſeveral heaps of wheat differently prepared, which he kept by way of experiment. Meſſrs. Duhamel and Tillet obſerving numbers of caterpillars in two of thoſe heaps, adviſed him to put that corn into an oven properly heated, in order to prevent the diſperſion of the butterflies, which they knew would otherwiſe infallibly proceed from thence: but this was neglected. On the 21ſt of June, about ſeven o'clock in the evening, they viſited this little granary, and found upon the corn a multitude of butterflies in great agitation, and of which a conſiderable number ſoon flew out at the windows. They took leave of M. de Taponnat, aſſuring him that this flight of inſects would ſoon light upon his ſtanding corn. When they were gone, M. de Taponnat had the curioſity to ſtep out, to ſee whether any great quantity of butterflies ſtill continued to iſſue from his granary; which he could eaſily do, as the window was very low. He was amazed at the numbers he ſaw fly out at that one window; being, as nearly as he could compute, about fifty in a minute. He obſerved, that they directed their flight towards a field of wheat not far off, and thereupon went thither with five or ſix others perſons, all of whom ſaw them arrive in ſwarms, proceeding chiefly from the granary. They ſaw many of them light upon the ears, and on their running a cane gently over the awns, beheld them riſe by dozens at a time. M. de Taponnat was ſo ſtruck with this ſight, that he ordered the window of his granary to be ſhut the next day, and his corn to be put into an oven properly heated as ſoon as poſſible.

A clergyman in the neigbourhood, who had a little barley infeſted with theſe inſects, could not be perſuaded to do the ſame, though his whole quantity was but a few buſhels. The conſequence was, that a multitude of butterflies were ſoon ſeen to proceed from the window of his granary, and ſpread ſo thick over an adjacent field of barley, that not an ear could be found without ſeveral of them upon it.

Theſe facts confirm all the former remarks of our accurate inquirers, who, after obſerving that the fitteſt time to find theſe butterflies upon the ears of ſtanding corn, is about half an hour after ſun-ſet, continue thus.

"On the 10th of June about eight o'clock in the evening, we viſited the fields around la Rochefoucault, and then perceived only a few butterflies upon the ears of the corn: they were greatly agitated; and we ſoon after ſaw numbers of the ſame ſpecies arrive on all ſides, but chiefly from certain mills on the banks of the river. Thoſe that were upon the corn flew away as ſoon as we approached them with a light. This was probably the time of their arrival. Towards nine o'clock we renewed our ſearch, and ſaw many of them clung to the ears, either actually coupled, or ſeeking to couple. The light did not affright them then, and we had time enough to examine them with a microſcope. We found fewer of them towards midnight, and could not ſee any early the next morning. It is not to be ſuppoſed that the diſperſion of theſe butterflies happens always regularly at the hours before-mentioned; for we have obſerved ſeveral variations, which depend on the warmth of the air; and they commonly ſettle upon the corn earlier when the ſun is overcaſt with clouds juſt before its ſetting.

"As we have not ever met with theſe butterflies in the day time, it may be aſked, where they then retire to? This queſtion deſerves an anſwer. We have ſearched for them in vain in hedges and among the blades of corn. Light certainly incommodes them: for when we expoſed to the ſun veſſels in which ſome of them were incloſed, they hid themſelves in the ſhade formed by creaſes of the paper at the bottom of thoſe veſſels, in ſuch manner that we were ſometimes puzzled to find them again. One day that the ſun ſhone very bright, we took two chriſtal cups, into one of which we put a few grains of wheat with ſome butterflies, then covered it with paper, and placed it upon its bottom, in a garden expoſed to the ſun. We put ſome butterflies into the other, but not any corn, and placed it cloſe to the former, with its bottom uppermoſt, that the butterflies might receive the full heat of the ſun: and laſtly, we ſet one of M. de Reaumur's thermometers upon the ground, juſt by theſe cups. When the liquor had riſen to from 45 to 50 degrees, (from 112 to 124 of Farenheit's) we ſaw that all the butterflies in the cup where there was not any corn, were dead: in the other, only ſome were dead; becauſe moſt of them had found a ſhady ſhelter, either by making their way into the grains, or by hiding themſelves under the paper cover. We knew before, that theſe butterflies are greatly agitated, and flutter very much when they are expoſed to the ſun; but we could not tell whether that proceeded from pleaſure or pain. The doubt is now removed; and we are of opinion that they retire to a cool or ſhady place during the day time, and that their ſmallneſs prevents our finding where they are hidden, which may perhaps be in woods or thickets, in crevices in the barks of trees, or in the earth."

That the caterpillars which produce firſt aureliæ, and then theſe butterflies, can, and frequently do, live under-ground, that they can paſs the winter there incloſed in the grain with which they are ſown, and even undergo their ſeveral metamorphoſes in the earth, ſo as to ariſe from thence, in the form of butterflies in the ſpring,

ſpring, has been demonſtrated by the following experiments:

In May, 1761, Meſſieurs Duhamel and Tillet planted, in a garden-pot, corn in which they knew there were caterpillars. They buried it an inch deep, watered it carefully, and ſaw that, notwithſtanding plentiful rains had fallen upon it, thoſe caterpillars changed into aureliæ juſt as if they had been in a granary. Theſe aureliæ produced butterflies, which, weak as they were when firſt hatched, ſoon made their way out of the ground.

To be the more certain of their power, with reſpect to this laſt article, the ſame gentlemen put ſome thoroughly dry, and well pulveriſed earth into a glaſs veſſel, then laid upon that earth a layer of corn in which they knew there were aureliæ, and covered this with equally well dried and pulveriſed earth, at leaſt half an inch deep; after which they tied a paper over the veſſel, to keep in the butterflies, in caſe they ſhould pierce through the upper mould. In effect, they did pierce through it, coupled, and laid ſuch quantities of eggs as covered its whole ſurface.

To ſee whether theſe inſects would riſe as eaſily from underneath a ſtiffer earth, and what effect their being buried deeper would have, a wooden box was divided into three partitions, and filled with common mould taken out of a kitchen garden. Corn known to be infected with theſe caterpillars was planted an inch deep in one of theſe partitions, two inches deep in another, and three inches in the third. All of them were then covered with a glaſs frame, and butterflies ſoon appeared in each of the diviſions; but they were far the moſt numerous in that where they had been buried but an inch deep. In another trial, a number of infected grains were covered with a ſtill ſtiffer earth, wetted, and preſſed down; and not any butterflies appeared there. At their firſt coming out of the ground, they are rumpled, as when taken out of a chryſalis: but after reſting a moment, they ſhake their wings, ſet them right, and ſoon take their flight.

That ſome of theſe butterflies can, and do come out of the ploughed ground which has been ſowed with infected ſeeds, is certain: but Meſſieurs Duhamel and Tillet are thoroughly ſatisfied that their number is but ſmall, that moſt of the caterpillars ſown with the grain periſh before they can reach the ſurface of the earth, and that the butterflies which proceed from granaries are the great ſource of the increaſe of this inſect: for, ſay they, the grain which contains a young caterpillar will grow, if its germ has not been damaged; and as its mealy ſubſtance is conſumed by the plant, the caterpillar muſt die for want of food. Beſides, as is proved by the laſt mentioned experiment, the butterflies cannot pierce through a cloſe and hardened earth; which generally is the caſe of ploughed land that has been expoſed to the winter rains.

After obſerving that the two ſexes ſometimes unite a ſecond time after ſeparation; that the female depoſits her eggs almoſt immediately after they are fecundated, in ſmall parcels of from 6 to 30, and that each female lays in all from 60 to 90; adding to this, that there are generally three flights in a year, one at the latter end of May or in the beginning of June, a ſecond in Auguſt, and a third in ſome of the ſubſequent months, during which a fourth alſo, and even a fifth, have been known; we may, from the following calculation, form an idea of the aſtoniſhing multiplication of theſe inſects, and conſequently of the ravages which they muſt make where they have eſtabliſhed themſelves.

Every female produces from 60 to 90 eggs, of which 75 is the medium: but let us ſuppoſe the number to be no more than 70. Let us ſuppoſe alſo, that of thoſe 70 eggs, one half only produces females, which makes the number 35. This multiplied by 70, the number of eggs laid by each, gives for the ſecond brood, from a ſingle inſect, 2450: the half of this number, ſuppoſed to be females, is 1225, which multiplied by 70, gives 85,750 for the third brood. The half of this number, being 42,875, multiplied by 70, gives for the fourth brood, 3,001,250; and the half of this, 1,500,625, multiplied by 70, gives 105,043,750 for the fifth brood: ſo that ſuppoſing five broods in a year, each female butterfly of this ſpecies that exiſts in May, produces, before the May following, no leſs than one hundred and five millions, forty three thouſand, ſeven hundred and fifty individuals of the ſame kind.

It is not agreed whether theſe inſects prefer wheat, barley or rye. The obſervations and trials made by Meſſ. Duhamel and Tillet ſeem to prove, that they attack indifferently which-ever lies moſt convenient for them; and that they do not ſpare maize, when it is ſtripped of its ſtalk and laid up in a granary, where they can come at the ſoft inſide part of the grain; or even oats, though it be the common, but miſtaken opinion of the people of Angoumois, that this laſt grain is a preſervative of others, eſpecially of barley, when ſown with it, or intermixed in the ſame heap.

M. Tillet incloſed ſeveral ears of ſtanding oats in a wide mouthed glaſs bottle, and put into it ſome of theſe butterflies; after which he covered the mouth with a piece of fine linen. The butterflies coupled there, laid their eggs upon the ears, and ſeveral caterpillars which proceeded from thoſe eggs, actually introduced themſelves into the grains. A manifeſt proof that, though the pendent poſition of the grains of oats, whilſt growing, may be inconvenient to the female butterflies, many of whoſe eggs may be waſhed or blown off, more eaſily than from other corn, before they are fixed by the viſcous matter which faſtens them to the huſks; yet the corn caterpillar can live upon oats. What is ſtill more extraordinary is, that grains of wheat, barley, rye, and oats, were mixed together in a glaſs veſſel, into which ſome of theſe butterflies were put: and the oats were damaged by caterpillars, as much as any of the other grain: though it is certain that theſe inſects do but little miſchief to oats in the granary; happily for the poor people who make bread of this corn.

In guarding againſt theſe inſects, the farmer has three objects: 1, to preſerve his grain for ſeed; 2, to keep it, for food and market; and, 3, the total deſtruction of the inſects.

To preſerve the corn for ſeed, it ſhould be threſhed out as ſoon as poſſible, in order to prevent the transformation of the caterpillars brought from the field, which otherwiſe ſoon become butterflies, whoſe prodigious number of eggs would exceedingly increaſe the evil. For want of this precaution, two thirds of the ſtore of ſeed-corn has frequently been deſtroyed.

The ſeed ſhould either be dried in an oven, in which the heat ſhould be ſtrong enough to kill the caterpillars, without deſtroying the vegetative power of the grain; which will be properly effected by 124 degrees of heat on Farenheit's thermometer, or ſoaked in a ſtrong lye of wood-aſhes and quick-lime, heated to ſuch a degree that the finger can juſt bear it. Let the corn contained in a

baſket:

basket be stirred in this lye, and the grains skimmed off that float on the surface. When the corn has been thus soaked for about two minutes, the basket which contains it should then be lifted up, and suspended by two poles, till the lye is drained off. The grain should then be spread very thin on the floor of a granary to dry, while a second basket-full is prepared in the same manner. The corn thus steeped, and we dried, will keep a year, and continue fit for sowing.

By following the above directions, corn may be preserved from the ravages of these or any other similar insects that prey upon it. *History d'un Insecte qui devore les Grains de l'Angoumois.*

BUTTER-JAGS, flowers of the wild trefoil.

C.

CABBAGE, the name of a plant well known, and of which there are several species cultivated.

Cabbages have lately been cultivated for the food of cattle, and by several experiments found to produce a very large increase when managed according to the principles of the New Husbandry. M. de Chateauvieux has been very particular in relating the success of his experiments, which we shall therefore give the reader.

"I began, says this curious gentleman in a letter to M. Duhamel, by retrenching the dung; though the spot I chose for my first trial had not received any for several years. It had indeed been well prepared by ploughing the preceding year, when one half of it bore barley, and the other oats. I now made it into a bed, the middle of which was directly over the last year's furrow. I ploughed this bed on the twenty-fifth of September, 1751, in the same manner as if it had been intended for wheat. I planted on it a single row of white cabbages, which I watered to make them take root the better. The length of this bed was one hundred and sixty feet, and its breadth six feet seven inches.

"That I might be able to make a just comparison between the cabbages of this bed, and those of the kitchen garden, I planted a spot of ground in the latter, the same day, with the same sort of plants. This spot had been extremely well dug, and plentifully dunged by the gardener, who took all possible care of these plants during the summer, and weeded them as often as was necessary. Instead of cabbaging, most of them ran up in height: upon which I plucked them up, and planted others in their stead.

"I bestowed the same care and culture on my row of cabbages in the bed, as if they had been wheat.

"On the ninth of March 1752, the alleys were stirred with the plough. On the twenty-fifth of April, I gave them a second stirring with the cultivator. On the third of June they had a third stirring with the plough: and on the twentieth of July, I made my gardener hand-hoe them, for fear the plough should damage several stalks of wheat which grew on the next bed, and were bent, but not lodged.

"These cabbages were never watered, except once, which was at the time of planting them; and yet they were always crisp and firm, even in the hottest days. By this easy and expeditious culture, they attained all the perfection that could be desired; and surpassed those of the kitchen-garden, as much in goodness, as they did in bulk. Most of them weighed between fifteen and eighteen pounds, and the smallest between eight and ten. The weight of all the plants which grew on this bed, was 840 pounds.

The circumstance of the cabbages continuing firm and crisp in the hottest weather, is remarkable. Mr. Baker, in the following experiment upon cabbages, makes the same observation. This is the effect of good and deep hoeing, and is taken notice of by Mr. Tull as the constant effect of horse-hoeing, and is so in some measure of hand hoeing, when well performed and deep. The earth being made fine by good tillage, imbibes the dews, and when hoed deep, retains them: they penerate deeper into the loose open soil in the night, than the sun and air can exhale them in the day: the roots of the plants are thus refreshed, and the earth is kept cool in hot weather, which greatly promotes their health and growth: for heat and moisture are principal agents in vegetation: this appears agreeable to reason, and is confirmed by experience. It is an observation of great importance in agriculture. It is so to farmers, who by good hoeing may keep their crops in health and vigour in dry hot weather, when the unhoed crops are parched and stinted by it. And it is no less so to gardeners; who by diligent and deep hoeing, might save themselves much of the expence and trouble of watering their plants. It is proper, however, to take notice, that this good effect of hoeing, is in consequence of the earth being fine, loose and open.

Hoeing of close, dry, hard earth, does not open and pulverize it at once, nor until it has been well broken and exposed to the air, and vicissitudes of the weather. It is this that pulverizes land beyond what is practicable to be done by hoes, ploughs, or any instruments of husbandry; and for this reason, those who would obtain the full benefit of hoeing, should be careful to keep their land constantly in good tilth; and when interrupted by the rains and snow in winter, they should be careful to take the first opportunity of dry weather to renew the tillage, which will undoubtedly prepare their land to receive the benefits of hoeing, which are very great, besides subduing the weeds.

The intelligent and careful cultivator Mr. John Wynn Baker, in a report he made to the Dublin Society, tells us, that he also cultivated cabbages after the manner of the New Husbandry, on a piece of ground that had bore potatoes the preceding year. It was manured with a compost of lime, earth, and dung, perfectly incorporated. On the sixth and seventh of July 1764, he planted one row of cabbage-plants on the middle of every ridge, of about an acre of ground, the plants in the rows being two feet from each other, and the rows five feet asunder. On the sixth of July a fine rain fell, and more on the eleventh and twelfth, which saved the expence of watering, and secured life to the plants.

On the seventh of August the cabbages were horse-hoed, by taking off, at one furrow of the plough, only one side of each ridge, close to the plants: in this manner they remained till the twenty-fifth, when the plough was run along in the same furrow; by which, with the first furrow, the soil was ploughed about twenty-one inches deep. This being finished, the earth was immediately returned back to the plants, which afforded them fresh nourishment; and in order to give their roots time enough to penetrate this fresh earth, which by the horse-hoeing, was become very fine mould, they were suffered to continue in this state until the twelfth of September: when they were again horse-hoed, by taking off the other side of every ridge; and on the twentieth the furrow was deepened in the same manner as the former, the mould immediately returned to the plants. On the eighteenth of October a small furrow was thrown up to each side of every ridge, which finished the culture, and restored the ridges to the form in which they were when the plants were put upon them.

The plants all grew luxuriantly; and in the hottest weather were infinitely more brittle in their leaves, than any in the neighbouring gardens; which is a certain indication of health in these kind of plants.

The horse-hoeing was so effectually destructive to the weeds, that the expence of weeding was a mere trifle.

On the eighth of December Mr. Baker cut one row of these cabbages, they then beginning to decay, which is indicated by their bursting. The number was two hundred and fifty-eight, and they weighed sixteen hundred weight, three quarters, and twenty-one pounds; which, at an average, is seven pounds and near six ounces for each cabbage.

The produce upon an acre, on weighing this row, which was five hundred and sixteen feet long, amounted to twenty-three tons, four hundred, two quarters, and fourteen pounds; which Mr. Baker observes is at least, from ten to seventeen tons less than the product would have been upon an acre, could he have obtained the large, late, Dutch cabbage.

The ingenious Mr. Randall, in a treatise lately published, entitled Semi-Virgilian Husbandry, has given us the following method of cultivating cabbages according to his newly proposed system, which is nothing more than the New-Husbandry executed by the ordinary implements.

The soil on which the cabbages are to grow, is supposed to be a loam in good heart; and as the Semi-Virgilian Husbandry requires only that the soil should be made exceeding fine, without the assistance of any dung, therefore the land destined for these cabbages must be thrown up to be fallowed, that it may enjoy all the advantages of a winter and summer fallow, so as to be exquisitely well prepared for the reception of the plants about Old Michaelmas.

As cabbages extract their nourishment from a considerable depth, as well as from the surface of the soil, it will be necessary that the land should be double trenched during the time of fallowing.

The loam, immediately after harvest, is to be turned up, and the workman is to go as deep as he can with his plough, another plough is immediately to follow in the same furrow with a higher earth-board, which will cast the mould over, and bury the stubble, if it was not before, by some other method, destroyed: in this manner the field will, as it were, be turned upside down, double spitted more than a foot deep, and the stubble will be sooner rotted. The harrows must then make the ground as fine as the season will at that time permit.

The next thing to be done, when the weather will admit of it, is to double trench the land, and lay it up till the spring in sharp ridges.

Here Mr. Randall makes a very sensible and useful observation, namely, that the teams must not be suffered to go upon the ground till it is first tried with a spade, to see whether the soil is dry enough to the depth it was ploughed before; for treading the ground in any season of the year, when it is not in order, or sufficiently dry, is a very destructive practice. The standard in this case recommended, very properly by Mr. Randall, is, when the mould crumbles or feels mellow between the finger and thumb, instead of adhering, so as to judge by the touch, whether the parts will give way to the tread, or whether the earth be in such a state of cohesion as to be padded under the horses feet.

The following directions are given for performing the ridge-work, or laying up the soil for the winter.

The ploughman is to begin in any part of the ground he pleases, and go one bout, throwing the furrows in such a manner, that they may form a little ridge. When this is done, the horses must turn to the left, and the share-point be put to the end of the trench; then go another bout in the manner already mentioned, the horses again turning to the left, and continuing to go on in this manner, till the piece of ground is ploughed throughout. If the plough begins close to a hedge, it may save some little trouble in going over more ground than is necessary; and where it can conveniently be done, the plough should cross the path the horses went in the first operation, as this cross-ploughing is often a means of stirring the baulks made by a former ploughing.

The firſt bout ſhould be drawn out as ſtrait as poſſible, as the reſt will depend upon it; and if the hedge is not ſtrait enough to allow this, the ploughman ſhould begin at ſome diſtance from it for the advantage of a ſtrait line, leaving the ſkirtings near the hedge to be laſt finiſhed. The land will now lie in gentle riſing ridges and regular valleys, ready for the third operation.

In this the ploughman is to go the very ſame ground over again, with the ſame plough, or one a little wider and higher in the earth-board, and throw the mould over the right and then over the left ſide of the firſt ridge, going four inches and a half, or five inches deep, and turning off, as before, continually to the left. This trench-work requires four good horſes to a plough; and the ſecond team, in the firſt operation, if the ground be hard, and has not been ſtirred for a long time, may require five horſes, but not more.

The ground will now lie in ſharp ridges, and deep trenches; and if the work be well executed, the bottom of the hollows or little ridges, will be near twelve, or at the very leaſt nine inches below the baſis of the ridges, or ſurface of the ground, and about eighteen inches wide; and the diſtance from the top of one ridge to another will be near three times and a half the width of the plough, as it runs in the ground after the horſes: the breadth of the ground, which each ridge ſtands upon, being about fourteen inches.

In this ſituation the land is to remain till the month of February, when the firſt opportunity that occurs in that month, the ridges and the whole ground being of a proper dryneſs, is to be ſeized for the next operation.

In the firſt place, a pair of ox-harrows, or the heavieſt of all, in many counties called drags, are to be yoked together, and the cattle are to go a-breaſt, not in a line; but two on one ſide, and two on the other, and to walk in the trenches, having a ridge between them; by which means the harrows will move on the crown of one ridge, at the center; and the outward parts, when well guided, will reach to the top of a ridge on each ſide that which divides the cattle. The harrows, which are to go only once in a place, will greatly reduce the ſoil, and pulling down the ridges, the ſoil will be in a manner level, yet not ſo even but that the ploughman may with eaſe diſcover where the ridges ſtood. The ploughman is now to proceed in the ſame manner as when he threw the ground into ridges, keeping the plough-ſhare along the crown of a ridge, which will be viſible enough after once harrowing. When he has gone one bout, which muſt be on the tops of two ridges, the furrows will be turned to the right, and lie pretty flat on that part which was a trench before: thus proceeding throughout the field, the whole will again lie in ſingle ridges, and ſingle trenches; but if the weather permits, as ſoon as this operation is performed, the ſoil muſt be double trenched, in the ſame manner as the ſecond ploughing of the ſecond operation, when it is laid in ridges for the winter; thus the whole field will again lie under the double work of high ridges and deep trenches.

We are now to ſuppoſe the ridge-work brought forward to the latter end of the ſpring, or the beginning of the ſummer, when weeds begin to grow plentifully.

The ridges muſt, at this time, be pulled down as before, with heavy harrows; but inſtead of going once, the ſervant muſt go twice in a place, and then uſe the lighter harrows, and afterwards the fineſt of all, in order to prepare the ground in ſuch a manner, as to induce a large crop of weeds to grow: but if the weather will permit the horſes to tread on the ground without ſpoiling it, the weeds muſt not be ſuffered to grow more than a plough can bury by going the uſual depth; and when the weeds are turned down, another plough is to follow, and to cover the furrow of the firſt, after which the land is to be harrowed down again as level as poſſible, in order to prepare it for yielding another crop of weeds.

When the ſecond crop of weeds is got to a tolerable height, it may be proper to try, with a ſpade, whether the firſt weeds, which were turned down to the bottom of the ſecond ſtratum, are ſufficiently putrefied: if they are, the land is to be ploughed as before; but if they are not, the weeds now growing muſt be turned down by one ploughing by ſuch a depth only as to bury them, and the land muſt be afterwards levelled with a loaded buſh harrow.

We may ſuppoſe, that by the middle of Auguſt, the weeds firſt turned down will be rotted; therefore at that time the third crop of weeds may be turned down by the double ſpitting, already mentioned, and left in this condition till there is occaſion to make uſe of the land.

Juſt before the time of planting the cabbages, the land muſt be laid as level as poſſible, and by frequent harrowings it will not be inferior to a garden for fineneſs.

The ground being now ready to receive the plants, it will be neceſſary to point out how they are to be raiſed and tranſplanted, which cannot be better done than in Mr. Randall's own words.

"The ground on which the cabbage-ſeed is to be ſown, muſt be exeeeding fine, in great heart, and abſolutely clear of weeds, otherwiſe it will be difficult to raiſe the plants in perfection; and, in order to this, the richeſt and cleaneſt piece of ground muſt be fixed on, immediately after the ſame harveſt, when the fallow for cabbages begins, and the nurſery for the plants muſt have all the advantages of fallowing equally with that which is to receive the plants; and about the middle of July the cabbage-ſeed is to be ſown: but as huſbandmen are unacquainted with the manner of ſowing this ſeed, it will be neceſſary to employ an honeſt gardener to perform this buſineſs as it ought; and the ſame perſon may be alſo employed to prick out the young plants upon another piece of ground, in great heart, and clear of weeds, leſt they ſhould draw one another before the ſeaſon arrives when they are to be tranſplanted out for good and all, on the ground whereon they are to ſtand for a crop: one perch will raiſe plants ſufficient for more than an acre of cabbages, from two ounces of ſeed, but it is better to have a great choice, as there will be ſome puny plants in the nurſery, let the gardener, or thoſe who prepared the ground, take what care they can; and the ſeed muſt be procured from Scotland, as the Scotch cabbage-ſeed is the propereſt for this vegetable, when deſigned for the uſe of cattle, as they will grow late, and to an enormous ſize, when they have all the advantages of ploughing among them, during the time of their growth.

"If the gardener is diligent, the expence of thus pricking out the tender plants, at ſix ſquare inches, on about ſix perches and a half, will be about four or five ſhillings; but if the owner can depend upon the nurſery's being clear of weeds, though the weather be very growing, there is a much cheaper method of raiſing the plants: for if the gardener, with the above two ounces of ſeed, to be ſown on ſix perches and ahalf, takes care to ſet out the plants with a ſmall hand-hoe, before they begin to draw one another,

another, he may hoe up the puny, and leave none but the ſtouteſt plants, at a proper diſtance, ſuppoſe ſix inches, aſunder, rather under than over. While he is doing this, he may aſſiſt the plants he ſuffers to ſtand, by giving them a little mould to their ſtems, and checking any weeds that appear; by this means, the plants will grow to perfection, and need not be removed till they are tranſplanted out for the crop: and if the gardener ſows the ſeed, and leaves the plants on the ſame ground, about ſix inches aſunder, one perch will tranſplant twenty-five, and conſequently, ſix perches and about a half, will tranſplant an acre, from two ounces of ſeed on ſix perches and a half, and ſet out at ſix inches from each young plant.

"When the plants are thus raiſed on the nurſery, by either method, pricking them out, or ſetting them out with the ſmall hand-hoe, and the ſeaſon is arrived for tranſplanting them on the ground they are to ſtand on to be cabbages, the next buſineſs is to conſider the diſtance they are to ſtand from each other, when tranſplanted; and here we muſt firſt obſerve, that gardeners uſually ſet them about two feet and a half from each other throughout the piece of ground allotted for that purpoſe; and, during their ſtay on the ſoil, they only hand-hoe and earth them up, when on the bed they are tranſplanted upon, without ever giving themſelves any farther trouble about them, being no ways anxious to make them grow to the largeſt ſize which they are capable of.

"In an acre there are 4840 ſquare yards, which is about ſixty-nine yards and a half every way; but in order to proportion an acre in a piece of ground, if the length be meaſured, and the above number of ſquare yards in an acre, be divided by the length, the quotient is the breadth, and both diviſions multiplied together will give 4840 yards. Now, as gardeners plant their cabbage-plants at two feet and a half aſunder, this is allowing ſix ſquare feet and a quarter for each plant, and makes the number of about 6970 plants on an acre; and plants ſet in two rows, at two feet aſunder, and the plants ſet two feet from each other in thoſe rows, and then meaſuring out four feet and a quarter from one of thoſe rows, and ſetting two rows more in the ſame manner, and ſo on throughout the ground; when the plants are ſet in this manner, the number of cabbages will be about 6970, which is the ſame as the gardeners raiſe on an acre, and the liberty of ploughing on one ſide of every row, or in the interval, and horſe-hoeing between the narroweſt rows, or the partitions.

"When the proper ſeaſon arrives, about Old Michaelmas, or a little after, the plants are to be ſet, as above, firſt one row the length of the ground, at two feet diſtance from each other; and, when this is done, then another row in the ſame manner, at two feet diſtance from the laſt; and, when this is done, another row muſt be planted, in like manner, at the diſtance of four feet three inches from the laſt; then another row of plants, at two feet diſtance from the laſt: here, then, one ſyſtem will conſiſt of one partition of two feet, and an interval of four feet and a quarter, and of two plants to each ſyſtem: for four feet and a quarter, added to two feet, and then multiplied by two feet, the diſtance of the plants in the rows, gives the parallelogram for two plants, or twelve feet and a half; and this, divided by two, gives ſix feet and a quarter; which is the gardeners diſtance, in their practice of cultivating theſe plants, or raiſing about 6970 cabbages on an acre, which is 2130 more than can be raiſed when they are planted in ſquare yards throughout the acre.

"The ground being thus planted, we are now to conduct theſe vegetables through all the ſtages of their growth, and to help them to nutritive principles in the ſtate of their greateſt exigency; and, in order to this, at the beginning of winter the ground muſt be taken good care of, not only to keep it dry, but alſo to drain off the chilling wets from the bed of plants, which, as was ſaid before, contains two feet. The firſt thing, then, to be done, at the approach of winter, but when the ſoil is dry, is to to throw the intervals up into a ſharp ridge, at two bouts, twice in a place, and as deep, each time, as the plough can go; this ridge-work, and double ſpitted, may be performed very well at two bouts, as it will allow nine inches in the middle of the interval, when the ploughman begins to turn the mould of the firſt bout upon; and then, at the ſecond bout, he will reach within three inches of the plants, if he meaſures the ground as he ought with his plough, in leaving nine inches, to turn the firſt furrow on, and keeps exactly nine inches in the ſecond bout, from the land ſide of the firſt: however, he muſt ſo manage his two bouts, as to come no nearer than three inches on the beds of plants, whilſt he is going the ſecond bout.

"This operation being over, the ground will then lie in the following form: there will be a high two-bout land in the interval, taking up five furrows in breadth, or three feet nine inches, reckoning nine inches for the breadth of the plough, as it runs in the ground; and there will be a drain, on the outſide of each bed of plants, nine inches wide, and, it being double ſpitted, or twice in a place, near a foot deep, at leaſt cut ſo with the plough, though ſome mould will unavoidably fall back again, notwithſtanding the care the ploughman may take to prevent it: and from the edge of the land ſide of each drain, or the breadth of each bed of plants, there will be two feet and a half of ground, which, through the winter, will be kept very ſafe from too much wet by means of thoſe drains; which is of great conſequence to the plants, as much cold moiſture brings on ſuch a condenſation and contraction among the component parts of this vegetable, that all the expanſive principles in the ſpring and ſummer cannot unbrace; by which a dwarf ſtate of the plant neceſſarily enſues.

"About the latter end of March, or the beginning of April, if the ground be dry, the ploughman is to go once in a place in the drain, or open trench, in order to deepen it ſtill more, and to ſtir the mould; and the ploughman need not be in any pain for the fibres of the roots, though he cuts or diſturbs ſome of them in this operation: for as the fibres, which have ſtretched out into the bed, are undiſturbed, he may cut off the outermoſt as near to the roots as he pleaſes, without doing any harm, unleſs he lets the plants down into the trench.

"When this operation is over, he muſt immediately throw down the ridge, by turning it back again, and leave an open trench in the middle of the interval, which may be done, very conveniently, at two bouts, without overthrowing the mould upon the plants; but he muſt remember to go twice in a place with his plough, to keep the ground double ſpitted, which is of great conſequence to the plants, and therefore he muſt not think of omitting it: after this operation, the ſoil will have a double trench, in the middle of the intervals, the width

of twice the breadth of the plough, and about twelve inches deep, if ſome of the earth did not fall back again; and there will be mould, the quantity of what is thrown out by the plough, in double ſpitting, lying between the plants and this open trench, and which will be thrown pretty near the roots of the plants; which mould is to continue there till the wants of this vegetable require us to make an alteration, when we have paid ſome attention to the partitions, and alſo to the plants themſelves.

"About the middle or latter end of April, if the ground is dry, the horſe-hoe muſt be uſed in the partitions, and the ploughman muſt go as deep with it as he poſſibly can, in order not only to diſturb the young weeds, but alſo to ſtir the earth, in the moſt effectual manner, within the reach of the fibres; but, immediately before this operation, the hand-hoe is to be uſed in the rows, between plant and plant, to check the weeds, and refreſh the mould about the roots, and the hoer muſt ſtrike his inſtrument as deep as he can; and when the weeds, any time after this, appear above ground, in the partitions, or among the plants, the horſe-hoe and hand-hoe muſt be uſed as before, but generally ſo timed, to be about a fortnight or three weeks after any alteration has been made in the intervals, that the fibres may have time, in either caſe, to heal again, inſtead of being diſturbed all at once.

"About the beginning of May the ploughman is to draw the heavy harrow, and then the finer, over the intervals, in order to pull the mould into the open trench, level, and make the whole interval fine, and to prepare it for a ploughing. Theſe harrows, being the ſame formerly mentioned, will do this buſineſs very well, without doing any harm to the plants; and if there be a good weight laid on them, they will do great execution, in pulling down the earth into the trench, and making the ground exceeding fine; which laſt article is of importance, as the plough will, in future operations, turn down this fine ſurface to a depth where the lower horizontal fibres will meet with it, and find plenty of nouriſhment therein.

"When the harrows have done their utmoſt, the ploughman is to go one bout, and throw up a ridge in the middle of the interval, if the ground is dry, and to double trench, as before; and in order to come near the plants, he may leave the breadth of about two furrows, on which to turn his bout, and then he will reach within ſix or ſeven inches of the plants with his ſhare: when this is performed throughout the ground, the harrows muſt immediately be uſed as before, and then the ploughman is to turn all the mould towards the plants in two bouts, and double trenching, by which there will again be an open deep trench in the middle of the intervals: and about a month after this he is to uſe the harrows again, if the plants do not ſpread too far into the intervals; if they do, he muſt level the ground with his plough, or the horſe-hoe, and then go one bout, and turn the mould on the breadth of a furrow and a half, ſtill going twice in a place; and then the ridge, and open furrow, on each ſide, will contain about two and thirty inches, or the breadth of three furrows and a half, and he will have gone within nine inches of the ſtems of the plants, which is near three inches farther off them than before.

"In this form the ground is to lie a month, unleſs the ſeaſon be very growing, and the weeds make a bold appearance; in that caſe, it may be neceſſary to diſturb them ſooner, by turning the ridge back again into the open trenches, and leaving the interval open in the middle, as formerly; and about Lammas, or a little before, the ploughman is to throw down the mould, into the middle open trench, and make the intervals level and fine, and this is the laſt operation ariſing from ploughing; the ground being now to remain, without diſturbance, any farther than what enſues from the uſe of the horſe-hoe, in the intervals, after the ground is made level, as, before ſummer is over, there may come up ſome weeds, which muſt not be ſuffered to appear with impunity. It is preſumed, that due care has been taken throughout the ſeaſon of the partitions, and between plant and plant in the rows, and likewiſe on the outſides near the plants, in the intervals, where the ſhare and coulter could not reach without doing damage; and therefore, when the vegetables ſhut out the horſe-hoe, in the partitions, or where the plough could not, or durſt not, reach, the hand-hoe was to have done its office, to ſupply thoſe wants, in the beſt manner it could.

"There is another method, which we have not mentioned, to tranſplant this vegetable on the ground it is to grow into a cabbage, which is cheaper; and it is this: thoſe ploughmen, who can draw out a very ſtrait furrow, ſet off firſt, and the perſons, who are ready with the plants, put them into the trench, ſo made with the plough, at their proper diſtance from each other; and when the ploughman has gone the firſt bout, within the compaſs of three feet and a half from the ſhare-point, he is to go another bout, to turn the mould into the firſt open furrow, ſo as not to bury the plants in this operation: and he will have gone theſe two bouts, one to open the ground for the reception of the plants; and the other to give them mould, by the time the people have ſupplied the furrows with plants, ſo that they may be all ready to ſtart together again when the team returns to the head-land, from making his ſecond bout.

The plants, on this occaſion, muſt be placed upright in the trench, ſtanding againſt the right-ſide of it, which may be done if the plough cuts the ground true, and the mould be well ſcooped out; and this will ſhew care in the perſon that holds it, and that his inſtrument is a good one. There muſt be a perſon to carry a gage, divided into two feet, in each diviſion, ten feet in length, which will contain ſix points, the two ends, and four intermediate ones numbered from one to ſix; which diviſion and points ſignify, that a plant muſt be placed in the open trench, directly againſt one of thoſe figures, as the gage lies upon the ground, when the man, who has the care of it, lays it down in a ſtrait line, according to his office. In order to ſhew how the plants are to be ranged, in a moſt regular manner, exactly at two feet from each other, in the rows, we will ſuppoſe the ploughman to be juſt ſetting off to go his firſt bout: in this caſe, the gager is to ſtand with his inſtrument, which may be a ſquare piece of wood, of about three inches over, or twelve in the girt, and numbered 1, 2, 3, 4, 5, 6, facing the right-ſide of the plough when it ſets off; he muſt lay his right-hand juſt beyond figure 4, and his left juſt beyond figure 3, and, holding it in this manner, he will poiſe the gage very well, and lay it down, take it up, and remove it, without trouble to himſelf.

"Now,

"Now, by ſtanding about five feet, on the right ſide, from the place where the plough enters, and two perſons with plants in their aprons, and a woman with a baſket full behind him, ſtanding on the left ſide, in this poſture of the people, the plough is then to move on, and when the ploughman has paſſed by the end of the gage, the gager is then to lay it down, but in ſuch a manner, that the end, number 1, may touch the place where the plough entered the ground, and the end, number 6, may lay in the right edge of the trench, on the mould turned out. The firſt man muſt fix his eye on figure 1, and, at the ſame time, the ſecond man on figure 4, and each of them is to place a plant againſt his own figure; and then the firſt gardener puts down another at figure 2, and another at figure 3, and while he is doing this, the ſecond gardener ſupplies figures 5 and 6, in the very ſame manner; and, when they are ſupplying figures 3 and 6, the gager is to ſtoop down to be inſtantly ready to take up the gage, in the manner before directed, and the gardeners muſt take care to keep time with each other, that there be no delay in moving after the plough, in its progreſſive motion.

"The gager is inſtantly to remove his inſtrument, placing the left end cloſe to the laſt plant, and the other end as before; and the gardeners are to take care of the three figures belonging to their office, the firſt man managing the three firſt numbers, and the ſecond the three laſt. They may go on very faſt in this manner, if they pleaſe, and, if they are three honeſt active men, no plough can out-travel them in making one bout: and in this operation it is expected of the ploughman, that he will make his horſes ſtep on briſkly, which they may very well do with ſuch light work; for, by the ſwifter motion of the plough, there is not only leſs expence attending this culture, but the trench is better cleared of the mould, and left ſquare; and the furrow is thrown ſo far to the right as to be in leſs danger of falling back again, which it may otherwiſe do, from a creeping ſluggiſh motion of the plough.

"Though two active gardeners, or huſbandmen, when the latter are uſed to the nature of plants, and placing them in the ground, may get forwards as faſt as the plough; yet, in order to have the plants properly put againſt the figures, it may be better to have them take their time, and to proportion their work in ſuch a manner, that they may finiſh by the time the team is at their heels, in ending the ſecond bout. The gager, and the two gardeners, need not be afraid of too much ſtooping; for the gager, when he ſtoops to put down his gage, has walked five feet, from the laſt place where he took it up, and, in fact, is only diverſion and exerciſe for him; and the firſt gardener, when he ſtoops to put down his three plants, ſtepping along at the ſame time, in that poſture, has ſix feet of ground to walk upright upon, which he may diſpatch very nimbly, if occaſion requires it; and the ſecond gardener, in like manner; and as a perſon attends them at their backs with a baſket of plants, they may, without loſs of time, be ſupplied, while they are walking, and take leſs or more into their aprons, or hands, as they ſee convenient, and conſiſtent with diſpatch.

"When the gager gets up to the far end of the ground, he muſt remember to keep on the furrow ſide of the plough, that is, on that ſide towards which the mould is turned; and the ploughman is now to receive farther directions how to proceed, when he has gone the two bouts, mentioned before. He was deſired to draw out a very ſtrait furrow when he firſt went up the ground, by taking ſight of a tree, buſh, or any other mark, exactly in the middle of the ground, and directly oppoſite to the place where he is to ſet off from, and which he judges to be in the middle; or he may uſe any method agreeable to himſelf, provided a ſtrait line be only drawn out by the plough, for on this depends the regularity of all the reſt of his bouts, and the operations of horſe-hoeing and ploughing during the growth of the cabbages. The firſt furrow being thus drawn out, the next buſineſs is, to turn the horſes to the right, and then to meaſure three feet and a half, from the edge of the land-ſide of the firſt furrow, or that edge cut with the coulter; and, making a mark at the end of three feet and a half, he muſt put the ſhare-point in there, and come ſtrait back again, keeping exactly three feet and a half from the far edge of the other furrow; and then, as was ſaid before, he muſt go a ſecond bout, to turn the mould into the open furrow where the plants are placed, which he may very well do without doing them any harm: if he proportions the depth of the furrows, where the plants are put, to their ſize, as they will be greater or leſs, juſt as the ſeaſon has been for their growth on the beds whereon they grew.

"When all this is performed, and the ploughman is ready to ſet off again, in order to make another bout, he is to turn to the right, to draw out another furrow, which is to receive the plants which muſt ſtand four feet and a quarter from the row of plants now on his right-hand; to do which he is to conſider, that the near edge of the open furrow next to him is the breadth of two furrows, or eighteen inches from that row of plants; and taking eighteen inches from four feet and a quarter, the remainder is thirty-three inches; and becauſe the plants muſt ſtand on the furrow ſide, therefore we muſt add the breadth of the plough, which is nine inches, to the above thirty-three, which then will make three feet and a half from the edge of the open furrow next to him; and now meaſuring three feet and a half from that furrow, he muſt make a mark, and go his bout, turning to the right, and making the ſame mark from the outermoſt furrow as before, and ſo proceeding ſtrait back again.

"He is now to go another bout, to earth his plants, and when he has done this, he muſt ſtill turn to the right, and make a halt on the head-land, to conſider what is next to be done: he knows the edge of the open furrow, now on his right-hand, and next to him is eighteen inches from the neareſt row of plants, and that the furrow he is going to open is for the plants to ſtand juſt two feet from the laſt row; and therefore taking eighteen from twenty-four, the remainder is ſix: and becauſe the breadth of the plough is nine, therefore he muſt meaſure fifteen inches from the edge of that open furrow next to him, and making a mark there, that is the place where he is to ſet off: and when he gets to the far end of the ground, he muſt turn to the right, and meaſure off fifteen inches from the edge of that open furrow next to him, as he comes down again: he is to go another bout to earth his plants, and then all things will be eaſy to him, as it will be only repeating what he did before; for as he is now going another bout, he is to meaſure three feet and a half, from the near edge of

the open furrow next to him on his right-hand, and go ſtrait up, and turning ſtill to the right-hand, he muſt meaſure the ſame diſtance, as he comes down again from that open furrow, and when he has made another bout to earth thoſe plants, he meaſures fifteen inches from the edge of that furrow; and when the plants are put into that he is now making and earthed, he then proceeds to meaſure off three feet and a half, which forms the interval, and ſo on earthing, and then meaſuring fifteen inches alternately with the other, for the partitions, till all is finiſhed.

"By which operations the whole ground will be planted with two rows, at two feet the partitions, and four feet and a quarter the intervals. Thus, then, upon the whole of theſe directions, when he firſt ſets off, and gets to the far end, and turning to the right, he meaſures three feet and a half; when he has earthed plants, he meaſures three feet and a half for the next bout to receive the plants; and, earthing theſe, he meaſures fifteen inches for another row of plants; and, earthing theſe, he meaſures three feet and a half; and earthing theſe, he meaſures fifteen inches; and ſo on, alternately, three feet and a half, and earthing; then fifteen inches, and earthing; then three feet and a half again."

The farmer will, doubtleſs, be glad to know what crop he is to expect from his land after all his labour: he has already been informed, that the number of cabbages on an acre, if they have all ſtood to maturity, will be ſix thouſand, nine hundred and ſeventy: theſe may be allowed to weigh, one with another upon a medium, three quarters of a ſtone each; and if an ox be allowed to eat nine ſtone a day, that is, twelve cabbages, then ſix oxen will live three months on one acre of them; ſo that ſuppoſing one acre of turnips, raiſed in the common method of huſbandry, to be ſufficient during the ſame ſpace of time for two oxen, we may ſtill expect, in proportion, three times more benefit from the cabbages than from the turnips.

Mr. Randall aſſures us, that the oxen will grow very fat upon ſuch food; that he has given it to many cows for a long time together, without perceiving the leaſt diſagreeable taſte, either in the milk or butter: on the contrary, the milk was rather richer and ſweeter; and that both oxen and cows are exceedingly fond of this food. The ſame may be ſaid of ſheep, which improve in their fleſh very faſt, and grow ſurprizingly fat on cabbages; yet has the mutton no diſagreeable taſte; ſo that there is perhaps no vegetable which will raiſe lean ſheep of the largeſt breed ſooner than cabbages. *Randal's Semi-Virgilian Huſbandry, p.* 315.

It has been fully proved by experience, that cabbages are not only very agreeable food for black cattle and ſheep, but alſo that they are very nouriſhing to them. They are compleatly fattened upon cabbages, and their fleſh is as well taſted, as when fed upon rich paſtures. Cows fed upon cabbages give a great deal of milk, and the butter made from it is excellent.

It was indeed for ſome time otherwiſe in the north of England, where cabbages were firſt cultivated at large in the fields, for feeding cattle; particularly the large Scotch cabbage; but it was diſcovered, that the bad taſte of the butter, when the cows fed upon cabbages, was wholly owing to giving them the decayed leaves: for when theſe decayed leaves are all taken off, and only the ſound cabbages given to the cows, the milk and butter is perfectly ſweet, and of a rich taſte. In taking off theſe decayed leaves, there is no loſs to the owner: for the dry cattle eat them greedily, and are much nouriſhed by them.

It is a great recommendation of the large Scotch cabbages, that they produce very large crops, from thirty to ſixty tons upon an acre, when cultivated upon good land, well manured, and horſe-hoed; which is moſt conveniently done, when they are tranſplanted upon ridges, between four and five feet broad, a ſingle row upon each ridge, and the plants ſet about two feet aſunder in the rows. The rows being thus far aſunder, there is good room to horſe-hoe them, which ſhould be done deep, and repeated till the hoe-plough is ſhut out by the ſpreading of the plants: the ground between the plants is likewiſe to be well and frequently hand-hoed, and no weeds ſuffered to grow large. The expence of this culture is fully recompenced by the greatneſs, and nouriſhing quality of the crop; by the hardineſs of theſe cabbages, reſiſting froſt; and by their coming into uſe in winter, and early in the ſpring: add to theſe advantages the improvement of the land, which is remarkable, the ſucceeding crops of whatever kind being extraordinary great. For an account of the feeding quality of cabbages, ſee LUCERNE.

In Mr. Baker's reports to the Dublin Society for the years 1769, 1770, and 1771, he has related a number of experiments that he made in theſe years, upon various ſorts of cabbages. Theſe he diſtinguiſhes into ſummer and winter cabbages. The ſummer cabbages are thoſe raiſed from ſeed ſown in March, are called ſpring or ſummer plants: and thoſe from ſeed ſown in Auguſt, are called autumn or winter plants.

In cultivating cabbages, the objects principally in view are, the quantity of food they produce, and their duration.

The quantity of food for cattle that they produce is very great; from twenty or thirty to fifty ton and upwards per acre. Black cattle and ſheep are remarkably fond of all ſorts of cabbages, and they are alſo very ſerviceable for feeding horſes and hogs; and afford good nouriſhment to all.

The duration of theſe plants is of great importance: for ſome of them continue ſound through the winter; and during the months of March, April, and May. This renders them peculiarly valuable: for in theſe months the winter proviſion for cattle is moſtly ſpent, and the graſs is not then advanced ſo far as to ſupply them, often not till the middle of May; for which reaſon farmers are diſtreſſed for food for their cattle, during the whole month of April, and part of March and May.

The firſt ſet of experiments on cabbages of different kinds, being winter plants, ſown in Auguſt, and tranſplanted the ſixth of March from the ſeed-bed.

N°. 1. The green borecole.
2. The long-ſided cabbage.
3. The flat Dutch cabbage.
4. The great Scotch cabbage.
5. The Anjou colewort.
6. The Batterſea cabbage.
7. The York cabbage.
8. The ſugar-loaf cabbage.
9. The green Savoy cabbage.

The ground upon which theſe were planted out, had the preceding year produced turnips, and the year before that, potatoes; and was twice ploughed for the cabbages, without any other preparation. Theſe plants were horſe-hoed the 25th of May; again in June, and the laſt time in Auguſt.

The horſe-hoeings were performed with a ſmall plough, drawn by two horſes, one before the other. Firſt turning a furrow from the row of cabbages of one ridge, and another furrow from the next contiguous ridge, both theſe furrows being turned into, and meeting in the interval between theſe ridges: the next hoeing turned the earth alſo from the plants, the plough going in the ſame tract as at the firſt hoeing, only deeper, and nearer to the rows: becauſe at the firſt hoeing, the plough does not go deep enough, and near enough to the rows; which it ſhould do as cloſe to the rows as can be done, without tearing out the plants. The third hoeing turns all the earth out of the interval up to the plants, which compleats the ridges as they were at firſt. This is the manner in which he hoed one ſide of each of the two contiguous ridges. The other ſides of the ridges were next hoed in the ſame manner. This is called alternate hoeing; and is neceſſary in hoeing ridges, upon which there is, as here, only a ſingle row of plants upon each ridge: for if they had a whole hoeing at once, viz. both ſides of the ridges ploughed away at once from the plants, the plants ſtanding upon a narrow ſlip of earth would be thrown down, in turning the ſecond furrow, if that was done before the earth of the firſt furrow was returned to ſupport the row. In hoeing cloſe to the plants, ſome few leaves will be broken off by the plough, but in no proportion to ſo many as might be imagined.

"The expence, ſays he, of theſe ſeveral operations, depends upon the nature and condition of the land; from three to ſix ſhillings an acre. This ſtood me in five ſhillings and ſix-pence;" [which is nearly 3s. and 5d. per Engliſh acre.]

As ſome earth will remain in the intervals, after the third hoeing, (called the henting) that ſhould alſo be thrown up to the ridges on each ſide, and will require one bout, if done with the hoe-plough; but with a double board-plough, the henting may be thrown to the ridge at half a bout, or one furrow; which will throw it all up, and leave a clear open trench between every two ridges.

The produce of the nine kinds of cabbages from each ridge 630 feet long, and 5 feet wide, with their average, and extraordinary weight, all being winter plants, was as follows:

	diſtance in the rows.	weight per ridge.	average weight.	extra. weight.	produce per plantat. acre	produce per Eng. acre.	Duration.
	inches.	C. qr. lb.	lb. oz.	lb.	ton c. qr. lb	ton c. qr. lb	No.
N°. 1. Green borecole.	18	00 0 00	0 0	0	0 0 0 0	ran to ſeed	2
2. Long-ſided.	24	33 3 27	12 1¼	16	38 1 0 18¼	23 15 1 0	6 To October and
3. Flat Dutch.	24	34 1 22	12 1¼	20	38 11 2 3⅝	24 1 2 0	7 November.
4. Scotch.	24	34 0 11	12 2	19½	38 4 0 13½	23 17 3 0	8
5. Anjou colewort.	48	23 2 20	17 0	24	26 10 1 19⅛	16 7 0 0	3 December and
Ditto, 3 feet diſtant.	36	30 3 21	16½ 0		34 13 0 11¾	20 8 0 0	4 January.
6. Batterſea.	18	13 0 14	3½ 0	5	14 14 0 2½	9 3 3 0	
7. York.	18	11 2 27	3 2	4	13 2 3 14¾	8 5 1 0	5 Middle of May.
8. Sugar-loaf.	18	11 1 0	3 0	4	12 11 3 20¼	7 17 2 0	9 February.
9. Green Savoy.	18	16 3 14	4½ 0	6	18 17 3 18¾	11 17 0 0	

1. The firſt column of the above table ſhews the diſtance at which the cabbages were planted upon the ridges.

2. The weight of the cabbages upon a ridge of 630 feet long, and 5 feet broad.

3. The average weight of the cabbages upon each ridge.

4. The weight of the largeſt cabbages of each ſort.

5. The weight of the Anjou coleworts, planted 4 feet diſtant in the rows, the average 17 lb.

Ditto, 3 feet diſtant in the rows, average 16½ lb.

6. Produce per plantation Iriſh acre.

Ditto, per Engliſh acre nearly.

7. Duration, or the time when each ſort began to decay.

The duration of cabbages, or how long they continue ſound, and without burſting, or running to ſeed is an important circumſtance; and it appears, by comparing Mr. Baker's experiments, with thoſe related by Mr. Young, in his North Tour, that cabbages of the ſame kinds, decay earlier in the ſeaſon in Ireland, than they do in England. The great Scotch cabbage in particular, which with Mr. Baker continued ſound no longer than January, is of much longer duration in England, as appears in the following tables from Mr. Young, ſhewing the duration of this ſpecies of cabbage, as he was informed by the gentlemen who cultivated it at large in the fields, viz.

Spring ſowing.

	Duration.
Mr. Middlemore,	April.
Mr. Lyſter,	Chriſtmas.
Mr. Tucker,	end of March.
Mr. Ellerker,	end of April.
Mr. Smelt,	end of March.
Mr. Scroop,	beginning of May.

Summer ſowing.

	Duration.
Mr. Tucker,	want cutting before Chriſtmas.
Mr. Crowe,	May-day.

"Mr. Young, ſays Mr. Baker, gives amazing accounts of the progreſs of the cabbage huſbandry in

England; and it ſeems to be univerſally agreed, that the cabbage anſwers all the purpoſes of maintaining and fattening horned cattle and ſheep. The kind which ſeems to be in moſt general uſe is the Scotch; though the turnip-cabbage, and borecole are not neglected.

"It appears that this Scotch cabbage is generally found with them to ſtand the winter. Some gentlemen informed Mr. Young, that they ſtand until April, and even May." I have juſt had the favour of a letter from Mr. Young, upon huſbandry matters, dated the 12th of April, 1770, in anſwer to one I wrote him upon this ſubject, and he ſays—"As to the Scotch cabbage all my accounts ran that it laſts quite through April; and I have now letters by me, juſt received from Mr. Scroope and Mr. Dodſworth, that their preſent crop is in fine order, with but few Black-caps among them. They are, as you obſerve, hard, but do not burſt until long after their looſe leaves are all dropped off, and their outward ſkin turned black."

"The long duration in England of the Scotch cabbage, would be to me ſurpriſing, did I not conſider two probable cauſes of accounting for it. In England the froſts begin in October and November, whereas in Ireland, thoſe months and December generally afford mild weather, attended with rain, and ſcarce any froſt until January, February, and March; and even then, in general inſignificant, when compared with thoſe of England, and particularly the northern parts, where the cabbage culture ſeems to be moſt adopted. Indeed I obſerve the like even in the wheat of Ireland: for in November and December it looks florid and healthy, even in poor grounds; but in January, February, even in March, and ſometimes in April, as this year, 1770, it falls off wonderfully, and looks ſickly, except where the lands are rich and dry.

"However, there is yet another probable reaſon why the cabbage which I have for Scotch, may decay ſooner than in England: mine, it is very likely, is not the true kind: and in truth I have thought them no other than the flat Dutch, becauſe they appear to be the ſame. If we look at the table taken from Mr. Young, we ſee ſome of the gentlemen find theirs to decay as ſoon as mine; ſo that it is mighty likely, theſe ſeveral gentlemen have not all the ſame ſpecies; becauſe there the difference of climate cannot operate."

Mr. Baker had planted his cabbages upon five feet ridges, and the large ſorts at two feet apart in the rows, but upon further experience found, that theſe diſtances were greater than neceſſary; and that larger crops were to be obtained by planting them on four feet ridges, and eighteen inches diſtance in the rows; and the ſmaller kinds at only one foot diſtance in the rows.

He likewiſe tried what crops could be obtained by ſowing the ſeed for winter plants earlier than Auguſt: but found the inconveniency of early ſowing: for in the year 1770, he ſowed the ſeed of ten different ſorts of cabbages for his winter crop, the 24th of July, which was attended with the two following ill conſequences, viz.

1. The plants grew away ſo faſt, that towards autumn they became much too large; and when he came to draw them up out of the ſeed-bed in the ſpring, 1771, to plant them in the full ground, he found that many of them had rotted in the ſhanks during the winter, and all of them were too long ſhanked. 2. Inſtead of ſpreading their leaves for cabbaging as they ſhould have done towards June they ſhot up, and broke out in bloſſom at leaſt nine out of ten; and the few that did cabbage were but ſmall, none weighing above ten pounds; and they began to go off early in October: hence he drew the following concluſion.

"That cabbage-ſeeds for winter plants are not to be ſown until Auguſt; and I ſhall add, as my opinion, not until between the 20th and 30th of that month."

"In the culture of the Anjou colewort, this year, 1771, I have been much more fortunate than in the ſorts above-mentioned, and that from a lucky circumſtance, viz. that in the ſummer 1770, I was attempting to raiſe the ſeed of this plant, for which I uſed to pay 40s. a pound. Had I bought the ſeed for autumn ſowing in 1770, I ſhould have been in the ſame ſituation with this, as I was with the preceding ones: having ſaved about nine pounds of this ſeed, on the 29th of Auguſt I ſowed about a pound of it: the ſpring was ſo dry that my tranſplanting was late, not until the 24th day of April. The land was thrown into four feet ridges, and in 1767 had produced potatoes, in 1768 turneps, in 1769 turneps and cabbages, in 1770 under cabbages, and the part planted this year with Anjou, was the two preceding years under the ſame plants. This field contains a little above 6 $\frac{3}{4}$ acres, near one acre was planted with the Anjou; one with other cabbages; four acres of graſs; and the head-lands with potatoes and carrots. The Anjou was horſe-hoed twice in the uſual manner.

"Eight horſes were turned into this field, to feed upon the graſs: they began immediately to feed upon the Anjou colewort with ſurpriſing avidity. This was an unexpected application of the crop; and loſt me the opportunity of weighing one of the rows as I intended. Upon the moſt moderate and equal calculation we could make, we apprehended the horſes were plentifully maintained three weeks upon this crop, which, at five-pence per horſe, amounts to 3l. 10s. I do not offer this calculation as being perfectly exact, though I believe it to be within, rather than over the truth.

"In a fortnight after the horſes were brought home, I turned in forty-five ſheep, three young calves, and a fine young bull, which I have; theſe remained here in the following order.

December 18th, turned in.			
January	9th, ſold	13	990 ſheep a day.
	16th, ſold	16	224 ditto.
	23d. ſold	16	112 ditto.
		45	1326

"Theſe 45 ſheep were not only maintained, but really much mended in fleſh and tallow upon this paſture; equal in point of time to keeping 1326 for a day. If we value this at an half-penny per head, the paſturage amounts to 2l. 15s. 3d.

"Beſides this crop of Anjou colewort, there was about an acre of ſummer cabbages, which, from late planting, were nothing: I leave them to counterballance for the food of the bull and three calves. By calculating from the improvement in the value of the ſheep, the profit made upon them appears to be 3l. 3s. from their feeding upon this crop: which ſhews, that I have

have not over-valued the paſture, of the ſheep, at an half-penny a day.

" The accounts being united will ſtand thus:

Maintaining 8 horſes three weeks,	3	10	0
Maintaining the ſheep as before-mentioned,	2	15	3
	£ 6	5	3

" Thus I think it comes out pretty clearly, that the Anjou colewort is worth at leaſt ſix pounds an acre: a produce by no means contemptible, when we conſider the cheapneſs of the culture; which, after the ground has been properly manured for potatoes, cannot amount to forty ſhillings, including rent, &c. But let no man imagine he can cultivate this or any other of the cabbage tribe, without liberal manuring; the moſt profitable method of doing which, is certainly by making potatoes the crop in preparation.

" Although the experiment before us, has not been attended with all that accuracy which I am fond of adhering to in my purſuits, yet it affords ſome important facts which may be depended upon; I ſhall collect them in one view.

1. That horſes will eat this plant, that they are fond of, and thrive upon it.
2. That ſheep thrive very faſt upon it; and are fond of it to exceſs.
3. That it affords them fine ſhelter, and food perfectly free from any kind of dirt.
4. That as fine plants may be raiſed from ſeed carefully ſaved in Ireland as from imported ſeed, I uſed to pay 40 ſhillings a pound for it: in 1774, I hope to ſupply the public at 4 or 5 ſhillings a pound; probably leſs.
5. That this plant may be planted upon the ſame ground for three year in ſucceſſion, without interminſion, even after producing turnips; being previouſly prepared by potatoes.
6. That ridges four feet wide, ſeem to be a ſufficient diſtance; as this, the third crop, upon the ſame ground, was a very noble one.
7. That Anjou coleworts, will in the winter pay more than three-pence half-penny a week per head, for paſturing ſheep.

" It was truly a pleaſing ſight to ſee the ſheep diſperſed through theſe lofty greens; the white and green made a variation every man muſt admire: half an hour's feeding the animals found ſufficient; then they marched as it were by mutual conſent to the clean graſs, and all lay down in a cluſter for an hour or two at a time: then roſe again, ſtretched themſelves, and all marched away to their food; and thus they went on day after day, until at laſt, I am ſatisfied, they lay down half the day: a ſtrong indication of their fattening faſt.

This plant grew with Mr. Baker, ſix and eight feet high: ſheep reach the leaves to about the height of four feet, and the horſes eat the upper part of them: he obſerves, that Mr. Young in his 4th vol. p. 202. ſays, " Anjou is good for nothing with Mr. Turner and Mr. Scroop. Savoys, I preſume the green Savoy cabbage, this in the ſame trial, in rows, four feet aſunder, by one foot in the rows, came to five pounds at an average, or twenty-four tons per acre, which is a conſiderable produce. Cattle like them very well, but they would not ſtand the winter."

" Here we find, ſays Mr. Baker, the account which theſe two gentlemen gave Mr. Young of theſe plants, appears to be diametrically oppoſite to my ſucceſs in the culture of them: with them, " the Anjou good for nothing;" and the Savoy, " would not ſtand the winter." The latter I cannot account for; the former I think fully in my power by my experiments this year: I can be almoſt certain, that the Anjou in their trials was ſown in the ſpring, and ſet in June. In that culture I can now inform the public, the Anjou are not ſo luxuriant as I expected they would have been. The weight of the Anjou has been already ſtated: its duration for plentiful paſture, continues until the middle of May; and the Savoy until February is expired. I uſed all I had by that time, though I believe they would have ſtood longer.

" A table of the duration of winter plants, ſown in Auguſt.

The claſs firſt in decay.

	Duration.
The longſided, The Batterſea, The York, The ſugar-loaf,	October and November.

The ſecond claſs.

The flat Dutch, The Scotch,	December and January.

The third claſs.

The Anjou colewort, middle of May.
The green Savoy, end of Feb. or later. See above.
Hogs eat raw cabbages greedily, and thrive upon them."

The ſeed of the Anjou was ſent by the Marquis of Turbilly to the London Society of Arts, who diſtributed it to many of the members; by which means this plant was raiſed in ſeveral parts of England; but it does not appear with what ſucceſs it was cultivated in England; except what Mr. Young mentions as above. Mr. Baker appears to have been the firſt who cultivated it with accuracy and ſucceſs. The Marquis calls it the Anjou cabbage, Mr. Baker the Anjou colewort, becauſe it grows with open leaves, and does not cabbage. It appears to be a very valuable plant, with reſpect to the great quantity of food it produces for ſheep and horſes; and eſpecially for its long duration, even to the middle of May, if the ſeed is ſown in Auguſt, and tranſplanted from the ſeed-bed into the full ground in June: add to this the excellent ſhelter theſe tall plants afford to ſheep.

Mr. Baker found, that from 16 to 20 pounds of ſeed, was the proper quantity to ſow in the ſeed-bed, to furniſh plants of the larger kinds of cabbages, ſufficient for an Iriſh plantation acre; which is from 10 to about 12½ pounds to furniſh plants for an Engliſh acre. The ſeed of borecole being ſmaller than moſt of the others, from 8 to 10 pounds of that, will be enough for an Engliſh acre. The ſeed of all the cabbages ſhould be ſown pretty thin in the ſeed-bed; allowing between two and three perches of ground well prepared, to every pound

of

of ſeed. The beſt way is to ſow the ſeed in drills: Mr. Baker ſays, that where handy active men are employed, three men will eaſily tranſplant an Iriſh acre a day, which is about an acre and a half Engliſh.

"The ſecond ſet of experiments made in 1769 upon the cabbage huſbandry, being the ſpring or ſummer culture,

The kinds were as follow:

		Diſtance.	Average.	Extra.	Produce of an Iriſh acre.	Produce per Engliſh acre.
		inches. feet.	lb. oz.	lb. oz.	Tns. C. qr. lb oz.	Tns. C. qr. lb
N°. 1.	The green borecole.	21 ¼ by 5	5 6½	8 0	19 4 0 17 1	12 0 0 0
2.	Great Scotch cabbage.	23 ½ by 5	6 13	9 0	21 16 3 11 6	13 12 2 0
3.	Anjou colewort.	2 feet by 5	5 9	0 0	17 15 2 17 14	11 2 2 0
4.	Chos du Milan.	2 feet by 5	4 8	0 0	14 8 2 7 0	9 0 0 0
5.	Turnip-cabbage.	18 in. by 5	5 0	0 0	21 00 0 0 0	13 2 2 0
6.	Jeruſalem colewort.	2 feet by 3	7 0	14 8	36 15 0 0 0	22 10 0 0
		2 feet by 5			22 1 0 0 0	13 6 0 0
7.	White brocoli, 2d. ſowing.	2 feet by 5	4 1	0 0	13 1 2 0 3	8 2 2 0
8.	Purple brocoli, ditto.	2 feet by 5	3 15	0 0	12 12 3 11 13	7 17 2 0
9.	Green brocoli, ditto.	2 feet by 5	3 8	0 0	11 3 3 4 8	6 17 2 0
10.	Red pickling cabbage.	23½ in. by 5	6 0	9 0	19 7 0 0 0	12 1 3 0

"The ſeed of theſe was ſown the 10th of March, except N°. 6, ſown the 24th of March: likewiſe a ſecond ſowing of No. 7, 8 and 9.

"Five plantation acres were prepared for theſe plants: the land was ploughed in November, again in April, and harrowed down; and the latter end of May it was thrown into five feet ridges, at three bouts of the plough. The 17th of June the land was manured, by laying the manure upon every ſecond ridge alternately, and throwing it equally into the two contiguous furrows; and immediately ploughed in, by turning the ridges into the furrows, by which means the new ridges ſtood over the dung, as in a hot-bed.

The 21ſt and 24th of June there was fine rain, and three plantation acres were planted from the ſeed-beds, with the plants, N°. 1, 2, 3, 4, 5 and 10. Mr. Baker finding the common dibbers made ſlow work, made dibbers of iron eighteen inches long, and ſeven pounds weight; which made quick work, preferable to marking out furrows in the ground with the plough, and much more exact. "I can, ſays he, put out an acre of plants, for at leaſt half, if not a fourth of the expence of tranſplanting the plants in furrows made by the plough; and ſtraighter, the top of the ridge being a guide to tranſplant them in a regular line, which is neceſſary where plants are to be horſe-hoed: another advantage is, that the ridges, when planted in furrows made by the plough, cannot be raiſed for the reception of the plants, and have not that depth of well prepared mould for the roots to extend it, as when the ridges are raiſed handſomely: ſuppoſe the ſtaple that our plough works in to be nine inches, by throwing it up into theſe ridges, I make it eighteen: if the ſtaple is but ſix inches deep by raiſing the ridges, they may ſtill be made near eighteen, by widening the mould-board of the plough. The benefit of this to the plants muſt be obvious to every man."

But here it is to be noted, that Mr. Baker ſaid this in the year 1769, when he made his ridges for cabbages five feet broad, which would admit of being raiſed high: but if the ridges were made conſiderably narrower, and the ſtaple was but ſix inches deep, by raiſing narrow ridges upon ſuch ſtaple to the height of near eighteen inches, ſo much of the mould would be raiſed into the crown of the ridges, that there would not be enough of it left on the ſides to be horſe-hoed; which is a neceſſary conſideration in the culture of plants by the horſe-hoe.

"I have already informed the reader, that the Scotch is the kind of cabbage in moſt general cultivation in England, for the purpoſe of the farmer and grazier. According to the information which Mr. Young obtained, ſome gentlemen have had above 50 tons upon an Engliſh acre, (and ſome few as low as 15 tons) as appears by the following table from Mr. Young.

On clays and ſtrong loams.	Tons.	Soil	Average weight. lb.	Diſtance	Room to each plant.
Mr. Turner	39				
Mr. Crowe	35	clay	15	2 ft. by 4	8 ſqr. feet
Mr. Scroop	37				
Earl of Darlington	40				
Mr. Dixon	48				
	—				
Average 39 Tons					
On rich deep light loam.					
Mr. Tucker	44	rich loam	20	2 & 2½ by 4	8 & 10 feet
On inferior ſoils.					
Mr. Middlemore	54	red ſand	14	18 in. by 4	6 ſqr. feet
Mr. Lyſter	27	light ſand	9½	2 ft. by 4	8 do.
Mr. Smelt	18	ſandy gravel	7½	2 by 4	8 do.
Mr. Scroop, Dalton	24				
	—				
Average 30 Tons.					

Duration of the different ſorts of the ſummer culture.

			Decay.
Firſt in decay	N°. 7 white brocoli, 8 purple do. 9 Green do.	March ſowing worth nothing for the farmer's purpoſe.	
Second do.	2 Scotch cabbage		In January
Third do.	7 8 9	July ſowing.	February
Fourth do.	10 the red cabbage.		March
Fifth do.	3 Anjou Colewort.		April
Sixth do.	1 green borecole		May
	4 chos du Milan		May
	6 Jeruſalem colewort.		April and May
Seventh do.	5 turnip cabbage	if taken up as directed, in Feb. will keep ſound till June, or later, if deſired.	June

"Conſider-

Conſiderations upon Borecole and ſome other Plants, dropping off in the Winter the Leaves of the Summer Growth.

Under this head I ſhall only conſider ſuch of our plants as ſtand the winter throughout: and of thoſe only ſuch as we have ſeen are moſt profitable in the courſe of our experiments, and therefore in this place I have only to take notice of the boorcole, the Anjou colewort, the turnep cabbage, and the red cabbage; theſe I think are the only plants which ſtand until ſpring, and caſt their leaves of the ſummer growth.

The borecole I have already ſaid ſtands the winter admirably; and as it caſts the ſummer leaves in December and January, proceeds in vegetation, and produces another ſucceſſion of leaves, not ſo large, but infinitely more in number.—With me all the ſummer leaves dropped off, and conſequently were loſt; but that need not be the caſe with other cultivators. I thought it neceſſary for the information and conviction of the public, to let this whole plantation ſtand, without any diminution but the natural; I ſtill think, as I did in the year 1764, that the moſt advantageous way of uſing this plant, would be by turning their ſheep into the field, as deſcribed in my report for that year. By that means the ſummer leaves will be turned to profit, which cannot anſwer any other way: for the pulling and bringing them home would be too expenſive, becauſe it muſt be all hand work, and men's carriage, to the head lands; as no carriage can be admitted amongſt the plants, the intervals being too narrow.

The Anjou colewort caſts its ſummer leaves in November and December, but will be handſomely furniſhed again by the winter growth, againſt the ſpring. The ſame objections hold good, with reſpect to making uſe of the ſummer leaves, by carrying them off, as I have juſt offered to the borecole: and this plant ſhould alſo be paſtured with ſheep, to prevent the loſs of the ſummer growth. The extraordinary height of this plant (viz. the winter plants) might be ſome impediment to its being paſtured by ſheep; as I ſuppoſe they cannot reach above four feet high, and my plants are now ſeven or eight feet: but I obſerved that the bulk of the ſummer leaves which fell off in the winter, were chiefly thoſe about four feet up the ſtem: thoſe above that height ſeem in general to ſtand the winter, and are food for horſes above where the ſheep can reach. Next to plentiful paſture, I hear the graziers always talk of good ſhelter. In plantations of borecole, Anjou colewort, and Jeruſalem colewort, we have a profuſion of paſture, and ſhelter beyond conception, for ſheep and lambs, and we have them both at a ſeaſon when they are moſt wanting, and when they can ſcarcely be had ſpontaneouſly upon any grounds, and more particularly on paſture.

"To direct the choice of ſpecies and ſeaſons for the advantageous progreſs of the cabbage huſbandry, I have added the following

Table of Succeſſions.

Species.	Sown	Planted.	In uſe	Duration.
The long ſided cabbage	In Auguſt	In March	In Auguſt	till November
——flat Dutch do.	Auguſt	March	December and January	January
——Scotch do.	Auguſt	March	December and January	January
——Anjou colewort	Auguſt	March	December and May	May
——green borecole	March	June	December and May	May
——turnip cabbage	March	June	February and June	June
——Jeruſalem colewort	March	June	December and May	May

By this diſpoſition of our cabbage crops, in ſufficient quantities, we ſhould have them, from the time of our graſs and clover being diminiſhed, until we can have thoſe two reſources again in plenty. Surely no conſideration can ſo much recommend this huſbandry.

The ſwine have had nothing all the winter but cabbages of different kinds, and they have done very well with that food, except ſuch as were not bred to it; thoſe do not keep themſelves in ſo good order with it as the others. I am aware that it will be a matter of ſome admiration to many, that I keep ſuch a quantity of ſwine, as I have frequently had occaſion to mention in this report: (83 head, viz. four or five very large ones, ſome middling, and ſome ſmall: upon the whole, if they had been all fat, I apprehend they would all have weighed upon an average three quarters of an hundred a piece.) My reaſons are principally, that of making great quantities of dung, to which this animal wonderfully contributes, and the obtaining large quantities of meat at a cheap rate, for a very large family, as mine is.

The turnip cabbage, and red cabbage, alſo caſt their external leaves the beginning of winter, and ſhould be taken off for the cattle before they decay; but ſhould not be fed off by ſheep, becauſe they will fall upon and wound the body of the cabbage, and do more damage than the value of the looſe leaves.

The turnip rooted cabbage is a ſpring plant, very hardy, and continues ſound through the winter and ſpring. The merit of this plant is in the root, the tops being very ſmall. The objection to it is the labour in getting up the roots, which cannot be done without a mattock or a very ſtrong three pronged fork. They are juicy, but not watry, have an agreable flavour, and the black cattle are fond of them; but are ſo hard they cannot eat them but with difficulty; and Mr. Baker found they made the cattle's mouths bleed, and therefore when given to them, the roots ſhould be firſt waſhed and chopped in pieces: and then they may be eaten by black cattle or ſheep; They produce a great quantity of roots.

Mr. Baker apprehending that the diſtances he at firſt allowed to his cabbage plants, (of 5 feet ridges, and 2 feet or more in the rows) were greater than neceſſary, and that greater crops might be obtained by planting them cloſer, viz. the ridges to be only four feet broad, and the plants according to their reſpective ſizes and luxuriancy, to be ſet in the rows, from one foot to two feet or more, gives the following table, of the moſt proper diſtances of the ſeveral ſorts, to produce the greateſt crops, from his obſervations and experience of the growth of each ſort, as follows;

The Table of Diſtances for the Cabbage huſbandry

	Seaſon.	Diſtance I have uſed.	Diſtance I venture to recommend.
The long ſided cabbage	winter plants	2 feet by 5 feet	2 feet by 4 feet, or 18 inches by 4 feet
The flat Dutch cabbage	ditto.	2 5	2 feet by 4 feet, or 18 inches by 4 feet
Ditto	ſpring plants	2 5	18 inches by 4 feet
The Scotch cabbage	winter plants	2 5	2 feet by 4 feet, or 18 inches by 4 feet
Ditto	ſpring plants	3½ 5	18 inches by 4 feet
The Anjou colewort	winter plants	4 5	2 feet by 5 feet
Ditto	ditto.	3 5	
Ditto	ſpring plants	2 5	1 foot by 4 feet
The green borecole	ditto.	21¼ in. by 5	1 foot by 4 feet
The turnip cabbage	ditto.	18 5	1 foot by 4 feet
The Jeruſalem colewort	ditto.	2 3	18 inches by 4 feet

At theſe diſtances, more plants will be required, and the expence of tranſplanting them will be ſomething greater; but theſe are trifling in compariſon with the increaſed products per acre.

Mr. Baker obſerving that a horſe employed to draw the cabbages home eat them very freely, ordered ſeveral other horſes, one after another, to draw home the cabbages, "and they all eat the borecole moſt eagerly. But what is more remarkable, the horſe which has been chiefly employed in this buſineſs, is in better order than any other draught horſe I have; and I find (from the nature of his employment, often requiring him in the cabbage field, when the horſes get their corn) he has been deprived of his ſhare of corn.

"Theſe events have determined me to try an horſe next winter with the borecole and hay, and another with the borecole and corn. It may be imagined that the borecole will gripe the horſes; I cannot tell, but the plant, as I before ſaid, is very dry and warm. Should it be found to anſwer the purpoſe of maintaining the farmer's horſes with a ſmall allowance of hay or corn, or even both, it will be ineſtimable indeed.

"With pleaſure I diſcover that the cabbage huſbandry is making great progreſs through the kingdom; but I receive ſo many letters, complaining of the ſeeds, not only being mixed, but ſo often, that not a grain of the kind they had been purchaſed for was among them; which, added to the prices they were ſold at, is a great diſcouragement to the progreſs of this huſbandry: I have therefore determined to raiſe the ſeeds myſelf, or all ſuch kinds as I have, or ſhall find moſt advantageous to the farmer's purpoſes. But as all the cabbage tribe are apt to engender, and produce baſtard kinds, I cannot raiſe many ſorts in a ſeaſon, to have them perfect, and therefore I cannot immediately furniſh every kind. However, I have made ſome beginning, and now have the following ſorts ready to ſupply ſuch as may call.

Green borecole, a ſingle pound 4 ſhillings; ſeven pounds at 2 ſhillings and 8 pence, per pound.	I uſed to pay 10 ſhil. a pound.
Reynolds's turnip-rooted cabbage, a ſingle pound 4 ſhillings; ſeven pounds at 2 ſhillings and 8 pence per pound.	Ditto 16 ſhil.
Jeruſalem colewort a ſingle pound 4 ſhillings; ſeven pound at 2 ſhilllings and 8 pence per pound.	Ditto 16 ſhil.
Anjou colewort, a ſingle pound 8 ſhillings; ſeven pounds at 5 ſhillings 4 yence per pound.	Ditto 40 ſhil.

By this reduction of prices, I hope the public will ſee manifeſtly that I have not any profit in view by this object; all I aim at is, to indemnify my expence, and to promote the cabbage huſbandry. If the demand ſhall be ſuch as to defray the expences, I do not deſpair of reducing the prices ſtill lower, ſince it is not the price I look at to indemnify me, but the quantity ſold.

CADDOW, a name given to the jack-daw, in ſome of the northern counties of England.

CADMA, the leaſt of the pigs which a ſow has at one farrowing; for they have generally one which is remarkably leſs than the reſt.

CALF, the young of a cow.

There are two ways of breeding thoſe calves you deſign to rear; the one is to let them run with the dam all the year, which is the common way uſed in the cheap breeding countries, which they reckon makes the beſt cattle; and the other way is, to take them from the dams after they have ſucked about a fortnight: then they teach them to drink flet or ſkimmed milk, which they make juſt warm for them, it being very dangerous to give it them too hot. The beſt time for weaning of calves is from January to May. Let your calves have milk for about twelve weeks; only a fortnight before you wean them from milk, let water be mixed with the milk; and after your calf hath drank milk about a month, take ſome of the freſheſt, ſweeteſt hay you have, and put little wiſps of it into ſome cleft-ſticks, which place ſo as the calf may eaſily come at them to learn to eat; and after Lady-day, when the weather is fair, turn your calves to graſs, taking them in a few nights at firſt, giving them milk and water, and ſometimes giving the ſame to them in a pail in the field, till you find they are able to feed themſelves, ſo as not to deſire it: but by no means let your graſs be too rank, but ſhort and ſweet, that they may get it with ſome labour. All wean their calves at graſs; for if you wean them in the houſe with hay and water, it is apt to make them big-bellied, and to rot; and when you have reſolved which of the males to keep for bulls, let the others be gelt for oxen, which the ſooner you do the better: when they are about ten or twenty days old, is the beſt time, and leaſt dangerous.

In Hertfordſhire, Eſſex, and moſt places near London, they commonly fat all their calves for the butcher, becauſe they have there a good market for them, and the lands are not ſo profitable to breed on as in cheaper countries; a good calf there often ſelling for as much as a good heifer, eſpecially if they are very fat and white, which they take a great deal of care to make them. Their

Their way of doing this is by keeping them clean, giving them freſh litter every day, which they lay upon their old litter; for they clear out their coops but two or three times in a year, and moſt commonly at a time when they have no calves in them: they conſtantly alſo let them have a large chalk-ſtone or two to lick, which they bore a hole through, and hang up by a ſtring in a corner of the coop, which prevents their fouling it with dung and urine. They alſo obſerve to ſet their coops where they may have as little ſun come to them as they can, that they be not made cloſe and ſtifling, and that they ſtand a yard above the ground, that the urine may run from them: and to make them white, they often let them blood when they are about a month old, and a little before they kill them; and becauſe they are often looſe, they do not let them ſuck their fill; but inſtead of it they ſometimes give them chalk ſcraped into milk, which they pour down with a horn; alſo ſalt and water, and ſometimes they cold bathe them, and give them bole-ammoniac and chalk, which they moiſten with milk, and make it into balls, and give it them. If a cow will not let a ſtrange calf ſuck her, rub both hers and the calf's noſe with a little brandy. *Mortimer's Huſbandry, vol.* I. *p.* 228.

A young calf is left with its dam the firſt five or ſix days, that it may be kept always warm, and ſuck whenever it pleaſes: but if in thoſe five or ſix days it grows and gathers ſtrength, there is a neceſſity for making a ſeparation, as he would exhauſt the cow if left always with her. Sucking two or three times a day will now be ſufficient. If you intend to fatten him ſpeedily, and, at the ſame time, render his fleſh fine and delicate, let him have every day raw eggs, boiled milk, and the crumbs of bread: by this means the fleſh, at the end of four or five weeks will be excellent. Calves, therefore, intended for the butcher ſhould not ſuck above thirty or forty days; but thoſe deſigned for the dam for two months at leaſt; as the more they ſuck, the ſtronger and larger they will prove. The beſt for bringing up are thoſe calved in the months of April, May, and June. It is ſeldom that thoſe which come later acquire ſufficient vigour to ſupport them during the inclemency of the following winter; the cold cauſing them to droop, and many of them to die. Thus calves deſigned for keeping ſhould be weaned at two, three, or four months; but before taking them totally from the milk, a little good graſs, or chopped hay, ſhould be given them, that they may become accuſtomed to ſuch aliment; for when they are to be entirely ſeparated from their dam, they muſt never be ſuffered to come near her either in the ſtill or paſture, whither they ſhould be ſent every day, and remain there, during the ſummer, from morning to evening; but at the ſetting in of the cold weather in autumn, they muſt not be let out till late in the morning, and brought back early in the evening. And as the pinching cold of winter will be extremely detrimental to them, they ſhould be kept very warm in a cow-houſe, and well ſupplied with water; ſaintfoin, lucern, &c. ſhould be mixed with their common hay. They muſt be let out only in warm weather. A great deal of care is neceſſary to bring them through the firſt winter, which is the moſt dangerous period of their lives; for they will acquire ſo much ſtrength during the following ſummer, that they will have nothing to fear from the cold of a ſecond winter. *Buffon's Hiſtoire Naturelle, tom.* IV.

The deſire of profiting by the milk of the cow, is often the cauſe of the calf's being too early weaned. A month or two more, in ſhort the time required by nature, would ſtrengthen it in its youth; it would grow more ſucceſsfully, and, in time, fetch a profit with good intereſt. But this is hardly done any where. No ſooner is it believed that it can ſubſiſt without the mother's milk, than the farmer thinks he gains a great deal by weaning it: ill fed, and infirm, it grows at beſt to be a ſorry bull, or feeble bullock, from which little profit, and much leſs ſervice, can be expected.

Ignorance and want of reflection form the principal ſource of this abuſe! People do not know, or do not reflect, that the vital flame, incloſed in the heart of a new-born animal, muſt be cheriſhed and augmented; that it attracts and is nouriſhed by that contained in the milk; that this vital flame, weak at firſt, would ſcarce have power to ſeparate the auxiliary fire from the milky particles with which it is incorporated, if milk was a leſs delicate ſubſtance than nature hath formed it for this firſt ſervice; but in proportion as the vital fire acquires force, the milk grows thick, becauſe its groſſer particles are deſtined for forming and conſolidating the body of the animal. When the vital flame is arrived at ſuch a degree, as to be ſuperior to the ſuccours which the milk can afford, nature excites the animal to ſeek a more ſolid nouriſhment, and then, but not before, is the time for weaning it. For, by anticipating that time, you run the riſque of leaving the animal imperfect in its interior parts: the aliment which is adminiſtered being above its ſtrength, it cannot perform a perfect digeſtion, and the nouriſhment it receives is much the leſs; becauſe, in all natural bodies, the ſtrongeſt juices, and the moſt efficacious qualities are always mixed, and, as it were, blended with the hardeſt particles. Hence it happens, that a ſickly animal does not derive from the ſame food ſo much nouriſhment as an animal in health. Indeed, the vital flame, too much employed in reſiſting the attacks of the corrupted humours, hath not force enough to extract from the aliment the neceſſary auxiliary fire it contains. Beſides, the food being only in part diſſolved, paſſes away in the excrements, and forms only a thin inefficacious manure.

As therefore we may be aſſured, that by weaning a calf too early, it will continue infirm and of ſmall value, ſo by leaving it with its mother, as long as its conſtitution requires, we may expect it will become ſtrong and vigorous; and by following this method, we can hardly fail of raiſing a breed of cattle, that will redound both to the honour and profit of the farmer.

Young calves are apt to be attacked by inſects, which diſturb and torment them, and, at the ſame time, prevent their fattening. In order to preſerve them from theſe inſects, and even cure them when they are attacked, it will be proper to prepare an ointment of melted hogs-lard and quick-ſilver, well rubbed together in a marble or iron mortar. Spread this ointment upon a linen-cloth, which wrap up in three folds, and ſtitch it for a collar to the calves. It will not only cure them, bnt alſo diſperſe the inſects.

There is no better nouriſhment for young calves, than vetches ſoaked in water till they ſwell; but obſerve to ſteep no more than will ſerve them for once; becauſe when they continue moiſt for any conſiderable time, they

are apt to grow ſour, and would then do them more harm than good. *Journal Oeconomique.*

CALKINS, a name given in ſome parts to a ſort of horſes ſhoes, made for froſty weather.

Theſe ſhoes, by forcing the horſe to tread wholly on the toes of his hind-feet, are apt to occaſion bleymes, and ruin the back ſinews. The farrier, therefore, ſhould be ordered to pare the horn a little low at the heel, and turn down the ſponge upon the corner of the anvil, ſo as to make the calkin reſemble the point of a hare's ear, which will remove the conſequences often attending the common ſquare calkin.

CALTHA, the marſh marygold, the name of a perennial plant, growing naturally in the low meadows in many parts of England.

M. Duhamel recommends this plant to the notice of farmers, as very uſeful to be cultivated as a winter paſture for cattle; and experience has juſtified his recommendation. Perhaps it might prove as uſeful in this country as in France, eſpecially as cattle are known to be extremely fond of it, and the plant might be eaſily cultivated.

CAMMOCK, the name of a troubleſome plant infeſting arable lands; but more generally known by the name of reſt-harrow. *See the article* REST-HARROW.

CANARY-*Seed*, the name of a ſmall ſeed produced by a gramineous plant, cultivated in ſome parts of England.

A correſpondent of the editors of the Muſeum Ruſticum, has given us the method practiſed by the farmers of the iſland of Thanet, in the culture of canary-ſeed. He obſerves, that they generally chuſe to ſow it in freſh land; that is, ſuch as has only borne graſs. After ploughing up the lay, and bringing the land into tolerable rough tilth, they ſow it with peas; theſe are kept clean hoed as uſual, and yield a good crop. The next year the land is well ploughed, and planted with horſe-beans, which thrive well in that iſland. Theſe two crops effectually kill the green ſward, or graſs; take off the rankneſs of the ſoil; and the frequent hoeings, which are neceſſary to keep the weeds under, bring the land into fine tilth. After the beans are off, a thorough ploughing is given to the land, and in that condition it remains till the ſpring: about the beginning of March, if the weather be fine, and the ſeaſon dry, the land is ploughed for the laſt time; immediately after which the canary-ſeed is ſown.

The farmers in that iſland uſed formerly to ſow canary-ſeed with a broad caſt, ſpreading it all over the land; but when this was the practice, they found it very difficult to hoe and keep the plants clean from weeds: at preſent they ſow it in furrows, made a-croſs the land, conſtantly taking care to make the ridges between the furrows as ſharp as poſſible: by this means the ſeed, which is ſown by hand, ſlips from the ſides and tops of the ridges in the furrows, and the plants come up in regular rows. The plants muſt be kept very clear of weeds by means of the hoe, weeding-hook, &c. and if it be a wet ſummer, the intervals muſt be hoed ſeveral times; but of this the intelligent farmer is the beſt judge.

Three pecks of ſeed are, in general, enough to ſow an acre, ſometimes more, and often leſs. The canary-ſeed ſeldom comes on till the wheat-harveſt is entirely over, and the corn houſed: but it muſt be obſerved, that the wheat harveſt is generally very early in that iſland. It is reaped with a hook, and as faſt as it is cut, the reapers lay it on the land in wads, as they call them, or parcels about the quantity of half a ſheaf of wheat unbound: in this manner, if the weather be favourable, it is left near a fortnight, at the end of which time, the wads muſt be turned, that the other ſide may be dried. If the weather be very wet, they muſt be turned oftener, to prevent the ſeed from ſprouting.

The price of reaping canary in that iſland is from ſix to eleven ſhillings per acre; and the price of threſhing and dreſſing it is five or ſix ſhillings a quarter. According to the goodneſs of the land, and the tillage that has been beſtowed upon it, the farmers there expect their return to be from twenty-five to fifty buſhels per acre; but the common crop is from thirty to thirty-four. It muſt, however, be obſerved that the farmers never pay ſo much as ten or eleven ſhillings per acre for reaping this crop, unleſs the canary be very much lodged and tangled, which it often is, owing to the land in which it grows being freſh, rich, and rank, and to the high winds to which that iſland is ſubject.

They ſow ſucceſſive crops on the ſame land for eight or ten years; and ſowing canary would be a very great improvement to lands which lie convenient for water carriage to London markets, was it not a crop the farmer ought by no means to depend upon, not only becauſe the return, or quantity it yields, varies greatly, but alſo on account of the fluctuation in the price of this ſeed in the London markets, where the greateſt and indeed almoſt the whole demand is. *Muſeum Ruſticum, vol.* I. *p.* 22.

CANKER, a ſmall ſpeck made by a ſharp humour, which gnaws the fleſh almoſt like a cauſtic.

This diſtemper often attacks the foot of a horſe, and generally proceeds from thruſhes, when they prove rotten and putrid, though many other cauſes may produce this diſorder. The method uſed by farriers for the cure is generally with hot oils, ſuch as vitriol, aqua fortis, and butter of antimony, which are very proper to keep down the riſing-fleſh, and ſhould be uſed daily till the fungus is ſuppreſſed, when once in two days will be ſufficient, ſtrewing red precipitate powder over the new grown fleſh, till the ſole begins to grow.

There is one great error committed often in this cure, which is, in not having ſufficient regard to the hoof; for it ſhould not only be cut off, wherever it preſſes upon the tender parts, but ſhould be kept ſoft with linſeed oil; and as often as it is dreſſed, bathe the hoof, all round the coronet, with chamber-lye. Purging is very proper to complete the cure. *Bartlet's Farriery, p.* 314.

CANKER, in trees, implies a wound or blemiſh in the trunk, which does not heal naturally, but will increaſe and damage, if not endanger the whole tree.

The canker in fruit trees is moſt commonly occaſioned by wet, which gets in at the cleft where the tree was graſted, or at ſome other wound which has been neglected; but it alſo proceeds ſometimes from the ſoil's not agreeing with the nature of the tree.

If this diſtemper be only ſuperficial, ariſing from a bruiſe, for example, which the bark may have received, it may be cured by cutting the injured part out with a ſharp knife, and then binding over it a mixture of cow-dung and earth, tied on with a wiſp of hay, likewiſe daubed with cow-dung. This muſt be done before the ſap begins to riſe; for otherwiſe the bark will peel, looſen,

looſen, and wither much farther than the bruiſe, to the great hazard of the whole tree, eſpecially if the ſtem be the part affected: for as to a bruiſed branch, the beſt way is to lop it off at once, if there be the leaſt ſuſpicion of danger. But when the canker has been bred in the tree, or when it has extended from the trunk to the branches, or from the branches to the trunk, ſo that after cutting away to the very quick, there ſtill remains an eye, or ſpeck, like that which is ſometimes ſeen to run through a whole plant of diſtempered corn, the ſhorteſt way is, to commit the tree to the fire, and to plant another in its ſtead. Mr. Nourſe is indeed inclined to think that, if the canker has not penetrated too far the tree or ſtock, ſuppoſing it to be of the apple kind, it may poſſibly be ſaved, by regrafting it with a winter quinnin, a boderan crab, a boon apple, or a golden pippen; neither of which he had obſerved ever to canker: but how accurate his obſervations may have been in that reſpect, we ſhall not pretend to determine. Certainly it may be worth while to try a change of fruit in all ſuch caſes, if they are not abſolutely deſperate. He aſſerts, upon his own experience, that the apple which we call a woodcock, is no way apt to canker, or to be blaſted.

This, if it be fact, renders it is by ſo much the more worthy of cultivation, as it is a great and conſtant bearer, and yields an excellent juice. The misfortune is here, as well as in the attempts which have been made to ſuit the ſoil and the fruit, that each of theſe is diſtinguiſhed, either by ſuch general appellations and deſcriptions as ſerve only to puzzle the huſbandman when he comes to real practice, or by names which are not known out of the places where they are uſed. Doctor Cullen will render a great ſervice to mankind, if he ſhould happily ſucceed in that important point, which, if we are rightly informed, is the object of his preſent ſtudies; viz. to aſcertain by an exact analyſis, which no one can be better qualified to do with the utmoſt preciſion, what are the component particles of each different ſpecies of ſoil, and what proportion they bear to each other. This, diveſted of that parade of ſcience, and of ſcientific terms, which the learned are too apt to diſplay, and which ſerves only to embarraſs common underſtandings, will, ſhould ſuch a work appear, as it is hoped that it will ſoon, anſwer a very eſſential purpoſe in agriculture, as well as lay a fine foundation for uſeful entertainment to gentlemen whoſe leiſure permits them to proſecute ſuch ſtudies. But the taſk, conſidered in all its various branches, is arduous indeed! worthy of that able phyſician (we uſe the word here in its moſt extenſive and moſt proper meaning) and ſkilful chemiſt, whoſe love for the welfare of mankind has prompted him to undertake it.

Mr. Worlidge aſſures us, that he himſelf cured a tree deſperately diſeaſed with the canker, by cutting off as many as he could of the cankered boughs, laying its roots bare during all the winter, and applying to them in the ſpring a great quantity of ſwines dung, not too new, mixed with the earth, which was then returned into its former hole. If this does not do, he condemns the tree to be grubbed up, as being paſt recovery. *Nourſe's Diſcourſe in the Benefits and Improvement of Huſbandry*, page 138. *Worlidge's Syſtema Agriculturæ, cap.* viii. *ſect.* ii.

CAPELLETS, in horſes, are particular ſwellings which thoſe animals are ſubject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow, they ariſe from bruiſes and other accidents, and when this is the caſe, ſhould be treated with vinegar and other repellers; but when they grow gradually on both heels or elbows, we may then ſuſpect the blood and juices to be in fault; that ſome of the veſſels are broke, and the juices extravaſated. In this caſe the ſuppuration ſhould be promoted, by rubbing the part with marſhmallow ointment; and when matter is formed the ſkin ſhould be opened with a lancet, in ſome dependent part towards one ſide, to avoid a ſcar: the dreſſings may be turpentine, honey, and tincture of myrrh. The relaxed ſkin may be bathed with equal parts of ſpirit of wine and vinegar; to which an eighth part of oil of vitriol may be added. The contents of theſe tumours are various, ſometimes watery, at others ſuety, or like thick paſte; which if care be not taken to digeſt out properly with the bag, will frequently collect again: was it not for the disfigurement, the ſhorteſt method would be to extirpate them with a knife, which, if artfully executed, and the ſkin properly preſerved, would leave very little deformity.

When thoſe tumours proceed from an indiſpoſition of the blood, they are beſt let alone, eſpecially thoſe of the watery kind, which will often wear off inſenſibly, without any applications: but when they are like to prove tedious, you ſhould endeavour to diſperſe them by bathing the parts with repellers, and have recourſe to rowels, purges, and diuretic medicines, to carry off the ſuperfluous juices and correct the blood. *Bartlet's Farriery*, *p.* 277.

CAPO, a word uſed in Cheſhire, to ſignify a working houſe.

CAPON, a cock-chicken gelded as ſoon as left by the hen, or at leaſt as ſoon as he begins to crow.

Capons are very uſeful to lead chickens, ducklings, young turkeys, pheaſants, and partridges, which they will do better than the hen, and at the ſame time make a ſtouter defence againſt kites and buzzards. The largeneſs of their body is alſo of great advantage, as they will cover between thirty and forty of them.

CARBERRY, a name given in ſome parts of England to the gooſeberry.

CARCASE, a name generally given to the body of a horſe.

The carcaſe of a horſe ought not to be too ſmall and ſlender; for a ſmall carcaſed horſe is generally weak. On the other hand, a very large carcaſed horſe proves often heavy and inactive, and when he happens to be underlimbed, it is reckoned a great fault, though this remark often fails, and horſes, that have been reckoned very much underlimbed, have proved as ſtrong, and fully as ſerviceable as any other.

A low back is another fault that almoſt every body complains of, and indicates weakneſs, though a moderate ſinking below the withers is not at all amiſs, if the back be otherwiſe ſtrait. When this ſinking is not great, the forehand generally riſes well. But when a horſe has a low back, and is higher behind than before, it is not only ugly, but ſuch horſes are generally weak, are apt to be pinched in their ſhoulders, and have an aukward way of going, owing to the heavineſs of their hind parts, which hinders them from getting on.

Some are fond of horſes which are home ribbed, which is indeed a property that denotes both beauty and

ſtrength,

ſtrength, as thoſe that are open ribbed are looked upon to be weak and looſe; but in ſome horſes the ſhort ribs approach ſo near the haunches, that they have ſcarce liberty to breathe, and ſuch horſes are the moſt out of wind of any other when put upon hard exerciſe, and eaſily go broken-winded. But a horſe that is open and looſe in his flanks, like a grey-hound, is liable to many diſadvantages, which it would be tedious here to relate; ſuch are always narrow over the chine, have little or no belly but what is forced by art and feeding; and though we find ſome of this kind more vigorous than others, and even exceed all expectation, yet the generality of ſuch horſes are ſeldom fit to carry a great weight, or to hold out in hard riding. Some are great admirers of ſhort backed horſes, which is a right way of judging, ſo far as this ſtands in oppoſition to a very long back. But ſome horſes are ſo very ſhort, notwithſtanding they are otherwiſe of a good ſize, that they ſeem to be loſt under common furniture. But when a tall horſe happens to have a ſhort carcaſe, and very long legs, like a ſpider, ſuch a horſe is ſeldom good for much. If a horſe's back be ſhort, his whole body and limbs ought to be ſhort, and then it denotes ſtrength and firmneſs; but moſt of theſe make but a ſlow progreſs on a journey, though they will endure and hold out as long as any other, unleſs they are urged on with horſes of greater ſpeed.

It always denotes ſtrength in a horſe, when his carcaſe is of a moderate ſize, his ribs large, his flanks not hollow but ſmooth and full, with a ſtrait back, or but a very little ſinking, his hinder parts, or uppermoſt haunches not riſing higher than his ſhoulders. *Gibſon on Horſes, vol.I p.* 31.

CARDOON, a kind of wild artichoke, propagated only by its ſeed, which is of an oval form, about as big as a grain of wheat, of a very dark green, or blackiſh colour, and marked with black ſtreaks from one end to the other. There are two ſeaſons for ſowing it: the firſt is from the middle to the end of April; and the other about a month later. The ſoil ſhould be rich, deep, and fine. In a bed of ſuch mould, four or five feet wide, two trenches ſhould be opened, a foot wide, ſix inches deep, and at leaſt three feet aſunder: or, to anſwer the ſame intention, the rows of holes of the ſame depth ſhould be dug ſtrait by a line ſtretched along the bed. Theſe holes ſhould be three feet aſunder, and in quincunx order; or, if a trench is uſed, the quincunx form ſhould be obſerved in ſowing the ſeeds, which is performed in the following manner. Five or ſix of the ſeeds are dropped nearly together, at the diſtances before mentioned, and then covered over: not with a deſign to let ſo many plants grow cloſe together in a thick cluſter; but, as the growth of theſe ſeeds is ſomewhat precarious, to be the more certain of having two or three plants at each ſtated diſtance: for if all of them come up, they are immediately thinned to that number; and if they miſcarry entirely in any one ſpot, the chaſm is filled up with plants taken from another place, generally a hot-bed, on which ſome of theſe ſeeds are moſt commonly ſown when its heat is expiring, for a recruit in a caſe of need. The firſt ſowing will generally come up in three weeks, and the latter in about fifteen days. Great care muſt be taken to keep thoſe plants clear from weeds, and to water them frequently, in order to make them increaſe in bulk, and not run to ſeed. But this intention will doubtleſs be much better anſwered in every reſpect by a judicious application of the principles of the New Huſbandry; we mean, by deep and frequent ſtirring of the ground on each ſide of the bed, letting the ſhare or ſpade approach to within a very few inches of the plants.

Towards the latter end of October, the cardoons thus cultivated will be fit for tying up, in order to be blanched. In order to this, a dry day ſhould be choſen, when all the leaves of each cluſter being collected cloſe together, wiſps of ſtraw, or long litter, ſhould be twiſted round them ſo as to prevent the acceſs of the air to any part of them, except their very top, which ſhould be left open. In a fortnight or three weeks the plants thus covered will become white and fit to eat.

This tying up, and blanching of cardoons, may be continued till the winter approaches, and then thoſe who are ſo fond of them as to think it worth their while to be at the trouble, may take them up, with ſome earth about their roots, and remove them into a green-houſe, if they have one, or into a cellar, and by that means keep them for uſe all the winter. Some of theſe may be replanted in the ſpring, in an open border, as before, to ſeed in June or July; or they may be cut down to the ground, when thus planted anew, and their ſecond year's ſhoots may be tied up and whitened as before.

Beſides the uſe which the Italians, French, and Spaniards, make of this cardoon, in eating it raw with pepper, ſalt, oil, and vinegar, many think it preferable to celery, when ſtewed, becauſe it is mellower, and much more tender.

CARLICK, the ſame with charlock. *See the article* CHARLOCK.

CARPET-WAY, a green-way, or path left in an arable field, without being ploughed.

CANE, a hollow place where water ſtands. It alſo implies a wood of alder, or other aquatic trees in a moiſt boggy place.

CARRIAGE, a general name for carts, waggons, and other vehicles, employed in carrying timber, corn, perſons, &c. from one place to another.

CARRIAGE, alſo ſignifies a furrow, or trench, for conveying of water to overflow and improve meadow-land. It is diſtinguiſhed into two ſorts; the main carriage, which ſhould be made with a convenient deſcent; and the leſſer carriages, which ſhould be ſhallow, and as many in number as poſſible.

CARROT, the name of a root too well known to need any deſcription here.

The Society for the Encouragement of arts, &c. being perſuaded that the cultivation of carrots for the food of cattle could not fail of being advantageous to the farmer, publiſhed a a premium of twenty pounds to the perſon who ſhould ſow the greateſt number of acres with carrots, for the feeding of cattle only; adding, that it was expected the perſon who received the premium ſhould give an account of the ſoil, culture, time of taking up, and their effects on the cattle fed with them.

This premium was accordingly given in the year 1766 to Mr. Robert Billing, a very intelligent farmer at Weaſenham in Norfolk, he having ſowed thirty acres and two roods of land with carrots, for feeding cattle only. At the ſame time he ſent an account of the methods he uſed in the culture of his carrots, which was ſo well approved of by the Society, that it was publiſhed

publiſhed at their requeſt: an abſtract therefore of this pamphlet muſt, we preſume, be very acceptable to the reader.

Mr. Billing obſerves, that the uſe of carrots for the winter-feed of cattle has been long known and practiſed in the eaſtern parts of Suffolk, where it is common to make carrots ſerve the ſame purpoſe turnips have many years done in moſt parts of the county of Norfolk; beſides, that many are ſent from thence to the London market: but carrots never have been ſown in the latter county, for the maintenance of cattle, till he tried a ſmall parcel in the year 1761, and another in the year 1762.

He thought it prudent, he ſays, to make thoſe trials before he became a candidate for the premium offered by the Society; the hopes of deſerving which encouraged him to venture a pretty large and unuſual expence, as well as the loſs of a great part of his winter crop, and which has thus become the means of making known, in his part of the country, a ſpecies of huſbandry with which they had before no acquaintance but by hearſay, being above fifty miles from the country where it had before prevailed.

In the year 1763, he ſowed thirty acres and an half by menſuration.

This quantity of land lying in three parcels, one, of thirteen acres, bore wheat in the year 1762; one, of half an acre only, had borne clover; and the laſt, of ſeventeen acres, turnips that year. The piece of thirteen acres is a cold loamy ſoil, ſhallow, and upon a ſort of ſoamy gravel. The half acre is a ſoil much mixed, upon a moiſt clay, the ſeventeen acres may be divided into two parts, the one of fourteen acres, and the other of three. Both are a light and dry ſoil, newly improved with a marle; the former, an exceeding good tempered ſoil, upon a marle; the other, a ſhallow black ſand, upon a kind of imperfect grit-ſtone, called, in Norfolk, a carr-ſtone.

Previous to giving an account of the ſucceſs of his crop of carrots, and of the uſe he made of them in feeding cattle, he deſcribes the manner in which he cultivated theſe ſeveral pieces of land, founded as well on the beſt information he was able to procure, as upon the obſervation afforded him by his own experience of the former year.

The wheat and clover ſtubble he ſplit down with the plough early in the preceding November, and is ſatisfied, from all the obſervations he has made ſince he firſt begun the cultivation, that whether the wheat ſtubble be, as it is called in Norfolk, flat work, or in ridges, or the carrots are to be ſown after clover or rye-graſs, the land cannot he ploughed too early; ſo that the froſt and ſnow may have their full effect in mellowing the ground for the reception of ſo ſmall a ſeed; and this is the more neceſſary to be attended to, the ſtiffer and tougher the ſoil ſhall chance to be.

The land that had been turnips he let alone till the end of January, or beginning of February, thinking this time enough, becauſe the earth was thoroughly cleaned by the cultivation and ſummer hoeing neceſſary for the crop of turnips.

Of the thirteen acres of wheat ſtubble, ſix were dunged for wheat, but not for carrots; four and a half not dunged at all; and two and a half for the carrot crop only. The clover land was dunged for the carrots: and of the ſeventeen acres that had been turnips in 1762, part had been tathed for the turnips, that is, where ſheep had been folded; and the whole crop of turnips was fed off by ſheep and neat cattle.

Four pounds of ſeed on an acre is ſufficient: but as the ſeed is very ſmall, light, and hard to ſeparate and diſperſe equally on the ground, he was at firſt a good deal puzzled how to overcome this difficulty; and though he was adviſed to make uſe of a mixture of ſand, he did not find it anſwer, becauſe the weight of the ſand carried it all to the bottom of the ſeed-cot: he ſows it therefore now unmixed, as they do turnips, after having forced it through a fine chaff-ſieve by rubbing.

It will be three weeks, after ſowing, and ſometimes longer, before the carrots appear: this is the principal advantage, beſides the difference of expence, the turnips have over them, for the latter are not ſown till about Midſummer, and coming quicker to the hoe, get the better of the weeds more eaſily; for weeds do not grow near ſo faſt about Midſummer, as in the ſpring.

The carrots lying a longer time before they come up, and continuing afterwards a long time very weak, they are ſeven or eight weeks before they are fit for the hoe, and in the mean time afford the weeds an opportunity to get ſtrength, in a ſeaſon too, when unluckily they grow the faſteſt: Mr. Billing is therefore of opinion, that though it is neceſſary to ſow carrots before turnips, it is better to ſow them as late as you can with ſafety to the crop; for of his, thoſe ſown in April on the clover ſtubble came much the ſooneſt to the hoe, though later ſown.

The wheat and clover ſtubble were ploughed three times; the piece after turnips but twice; the firſt time ſhallow, the ſecond as deep as the ſtaple of the ground would permit; and on this ploughing the carrots were ſown.

As it would remove ſome of the objections to a carrot crop, and lighten much the expence of weeding, could they be ſown later, and as this might be done could the ſeed be made to come up ſooner, this ſenſible farmer imagines the ſeed might be ſteeped in ſomewhat that would forward its vegetation, and afterwards ſown, when dry enough to ſeparate.

Yet however expenſive the ſtrength of the weeds in a crop of carrots makes the hoeing of them, the crop itſelf is not apt to ſuffer, for though the young carrots are quite covered in a thicket of weeds before hoeing, and ſhould be buried in earth after the hoeing, yet they ſeem no way hurt if they get clear again, as they generally do in a fortnight after, if not cut off, or buried too deep, for want of ſkill in the labourer.

The Norfolk hoe is ſix inches wide. If the carrots chance to be tolerably clean, they may be hoed the firſt time for eight ſhillings per acre; but if the ground be full of weeds, occaſioned either by much rain, the foulneſs of the ground before ſowing, or the length of the time between the ſowing and hoeing, the firſt hoeing will amount to ten or twelve ſhillings per acre.

About ten days or a fortnight after hoeing, they ſhould be harrowed: this will diſplace the weeds, and prevent their growing again, which many of them will otherwiſe probably do, eſpecially if it be ſhowery weather: the harrowing does not hurt the carrot plants, but, on the contrary, does them much ſervice, by bringing freſh earth to them, as well as killing the weeds.

About three weeks after harrowing, in caſe it has not perfectly cleared the ground of weeds, or in caſe new weeds come up, Mr. Billing hoes the carrots a ſecond time, which coſts about 4 or 5 ſhillings per acre, as the ground is more or leſs foul; and after this, if there ſtill remain any weeds, which will be the caſe if much rain falls during the time of the ſecond hoeing, a ſecond harrowing is beſtowed.

Where the weather has been favourable, and thoſe employed in hoeing have done their duty, the carrots once hoed and harrowed have been as clean as thoſe on which two hoeings, and as many harrowings have been beſtowed.

Mr. Billing next proceeds to inform us of the ſucceſs he had in the year 1763, on the ſeveral parcels of ground already deſcribed. His carrots proved beſt on the piece of two acres and a half that had been wheat, not dunged for the crop of wheat, but dunged for the crop of carrots, and on the half acre clover ſtubble dunged for the carrots.

Many of the carrots out of both pieces meaſured two feet in length, thoſe on the former from twelve to fourteen inches in circumference at the upper end, and thoſe of the latter from twelve to ſixteen; a difference of bulk owing, perhaps, both to the difference of ſoil, and the effect of former crops.

On the two acres and a half Mr. Billing computes he had from twenty-two to twenty-four loads per acre, and about fifty-five, or fifty-ſix cart-loads on the whole: the half acre on clover ſtubble produced about twelve loads; the ſix acres and a half dunged for wheat, but not for carrots, produced from eighteen to twenty cart-loads per acre, and in the whole about one hundred and four loads; the four acres not dunged for either wheat or carrots, produced from twelve to fourteen loads per acre, and in the whole fifty-two loads.

He had but an indifferent crop of turnips the ſucceeding year, on the ſeventeen acre piece, but had from ſix to eighteen cart-loads per acre of carrots on fourteen acres of it, but a very poor crop on the three remaining acres; ſo that he computes he might have on the ſeventeen acres after turnips not quite two hundred and ſeventy loads, which make, with the former, about five hundred and ten loads of carrots, equal in uſe and effect to near one thouſand loads of turnips, or three hundred loads of hay, as experience has convinced him from the various methods in which he had tried them.

Mr. Billing thinks it is not improbable that he might beſides loſe five or ſix loads, which the poor people took, inſtead of a ſingle load they might have ſtole, had the land been cropped with turnips; but this loſs will be evidently much lightened, ſhould the growth of carrots become general in the country.

The beſt method of drawing the carrots is with a four tined fork, with which a man breaks the ground ſix or eight inches deep, very carefully without injuring the carrots; and is followed by a little boy, who gathers the carrots, and throws them in heaps.

Our farmer began to draw his carrots for uſe about three weeks after Michaelmas; but as the cattle he intended to feed on them had never been uſed to ſo hard food, he thought it beſt to give them, at the ſame time, both cabbages and carrots, leſt they ſhould ſuffer by a diſtaſte at the beginning.

He had about forty load of cabbages growing on one half acre, equal in uſe, as appeared on trial, to about ſeventeen or eighteen loads of carrots. He obſerved, that cattle of every ſort naturally eat the cabbages as readily as they would have done turnips; and ſoon after having gradually learnt to eat carrots, began to prefer them. Both the cabbages and carrots, and afterwards the latter with turnips, were brought from a place where they grew, to a paſture cloſe; and, without any other preparation than ſhaking off the dirt, they were diſperſed on the ground for the cattle to feed on promiſcuouſly.

From the experience Mr. Billing has had in fattening cattle on turnips in houſes or ſtalls, he is perſuaded that by this means the carrots might have been made to go a great deal further; but beſides the great trouble attending this method, eſpecially if the number of beaſts be great, and the hazard of beaſts foundering in the way to London, an accident that often happens to ſtall-fed cattle, and that the benefit of their ſtale is loſt to the ground, he is convinced the beef is not ſo good, though perhaps more ſightly.

The firſt flock he began to feed in this manner conſiſted of twelve neat beaſts, and forty-nine ſhearing weathers, or thoſe not quite two years old: ten of the former were Norfolk bred ſteers, and began to feed on the firſt carrots he drew: at the ſame time he put on a cow, and a heifer three years old. At old Martinmas Mr. Billing bought ſeventeen Scotch bullocks, which, with a cow from his dairy, made up the number thirty; and ſoon after he increaſed this number to thirty-three, by adding three more from his dairy.

It is, however to be obſerved, that when the cabbages were ſpent, he allowed a load of turnips each day for ſome time for this flock of cattle, which, with three loads of carrots, was a ſufficient proviſion for them. This enabled him to determine, that one load of carrots is nearly equal to two of turnips; for if the cattle had been fed on turnips only, it would have coſt him little leſs than ſeven loads, computing on the experience of many years fattening cattle with turnips; yet he declares he never knew cattle thrive faſter.

Nine of the ſteers were ſold fat in Smithfield on the ſeventeenth of February, and weighed about forty Norfolk ſtone, that is, ſeventy London ſtone, each. Another ſteer and cow were killed in the country, the latter at Weaſenham town, and which died very fat, about the ſame time: the Scotch were ſold at St. Ives about the beginning of May: the ſteers ſold in Smithfield for about ſeven pounds fifteen ſhillings each.

Our farmer being told the market was then low there, ſold all the Scotch, except one, at St. Ives, where they fetched him about ſeven guineas each.

The former coſt about four pounds ten ſhillings each; the latter three pounds fifteen. The other Scotch he ſent to London, where, though it weighed but a little above ſixty ſtone, it ſold for eight pounds, and was ſaid to be ſome of the fatteſt beef killed in London that winter, as Mr. Billing was informed by Mr. Brownſworth the ſaleſman: the others were not inferior.

The forty-eight weathers were ſold at St. Ives in the month of May, at about fifteen ſhillings each.

Theſe thirty-three beaſts, and forty-eight ſheep, brought Mr. Billing, according to his computation, about one hundred and twenty pounds profit; out of which deducting

gone

one tenth for the ſhare the cabbages and turnips had in fattening them, which is rather too much, eſpecially as the cattle ſoon began to leave the turnips, there remains one hundred and eight pounds to be carried to the account of the carrots.

The large quantity of carrots our induſtrious farmer had growing gave him alſo an opportunity of trying their uſe in feeding dairy cows, ſheep, horſes, and hogs.

In the month of April he found he ſhould have nine or ten acres to ſpare, beyond what is neceſſary to complete the fattening his bullocks. This happened too at a time when his turnips, as well as thoſe of his neighbours, began to decay, and enabled him to ſupply that defect, to which the Norfolk farmers are very ſubject in the ſpring of the year, and which no method of managing their turnips ever exempted them from, when the weather is wet and froſty by turns; and from this decay the carrots ſeem protected by their hardineſs. From this time he fed his whole dairy of thirty-five cows, and his flock of twenty-one ſcore of ſheep, on carrots.

At the ſame time he thought of a method of getting the carrots out of the ground with more eaſe and expedition than he had done before, which was of great uſe when he had other occaſions for his ſervants; beſides which it alſo prepared the land better for the enſuing crop.

They were ploughed up with a narrow-ſhared wheel plough; going ſlow, the ſhare opened the earth, and cut very few of the carrots; thoſe few being only ſuch as chanced to meet the very point of the ſhare.

The plat or earth-board, turned moſt of the carrots out of the ground, and, by harrowing afterwards, were moſt of them quite cleared from the earth. Though the roots extended a good way in the ground, and below the pan, he did not think it neceſſary to plough ſo deep, and conſequently the land ſuffered no damage, which otherwiſe it might have done, as ſome few of the carrots inſtead of being turned out, were buried: it is alſo neceſſary to plough the land and harrow it a ſecond time; but though this ſhould be at an interval of a month, the buried roots will take no harm.

Mr. Billing turned his dairy cows and flock of ſheep on this land after the ploughing, without any further trouble or preparation, and had all the reaſon in the world to be pleaſed with the event; both took readily to eating the carrots, though he thinks the cows more ſo than the ſheep.

The former not only gave more milk than is uſual at that time of the year, but many continued to give milk, which would with ſuch turnips as he had then to give them, have been nearly dry. The butter made was likewiſe much better than that of turnips; and both ſheep and lambs did much better than he ever remembers them to have done at this ſeaſon of the year: beſides this, the land was evidently very much improved from the ſtale of the cattle, of which he plainly perceived the benefit in the enſuing crop.

It is proper to obſerve, that in this method, ſome few of the carrots continued buried, even after a ſecond ploughing; but theſe were turned out upon a third ploughing, when barley was ſown, and were clean eaten up by a flock of ſheep, without any injury to the new ſown barley.

In this manner the cows and ſheep were fed for three weeks, which Mr. Billing values at about twenty pounds; and, conſidering how he might have ſuffered, had he wanted turnips, and not been able to ſupply that want with carrots, he thinks, he might value his feed at a great deal more.

In November 1763, he began to feed ſixteen horſes, which did all his farming work, with carrots: they had neither hay nor corn, except his team that carried his corn to Brancaſter, a ſea-port, at fifteen miles diſtance: to this team he allowed a buſhel of oats a day: the reſt had nothing beſides carrots, except peaſe-ſtraw and chaff, until the ſowing barley. In April he increaſed their work ſo much, that he thought it neceſſary to give them a few oats; but they continued to ſubſiſt chiefly on carrots, until they were turned to graſs, the latter end of May.

Mr. Billing declares he never knew his horſes in better order, or do their work better; and they were ſo fond of carrots, that he frequently found, that when the team mentioned before was ſo fatigued, that they refuſed to eat their corn, they would eat it when mixed with the carrots chopped.

It may be proper to obſerve, that he always chopped off the heads and tails of the carrots he gave his horſes, and ſometimes gave them another cut. Though he could not find it was neceſſary, he maſhed them alſo for his horſes, none of which trouble he found at all requiſite or even uſeful for other beaſts: the gathering and removing the carrots, and diſperſing them about the paſture-land where he fed his cattle, were ſufficient.

Mr. Billing gave the ſixteen horſes two loads of carrots every week; and theſe two loads, he computes, ſaved him more than a load of hay; which, at twenty-five ſhillings a load, amounted to thirty-five pounds.

To this might be added, the benefit received by the ſwine, to which he threw all the tops and tails of the carrots uſed for the horſes; and they throve exceedingly, and were ſo fond of them, that he never could find that any dirt which might ſtick to them, prevented their eating them: but as the principal part of the food of the ſwine was milk at firſt, and afterwards peaſe, our farmer has not ſet any value on this part of his profit: the total of what he has eſtimated is on the other articles, amounting to one hundred and ſixty-three pounds.

Of the thirty acres and a half, four were ſown in the year 1764, with oats, all the reſt with barley: the four acres were part of the land where he ploughed up the carrots; the reſt of this piece was ſown with barley; both produced a prodigious crop, not leſs than three loads of corn in the ſtraw, per acre: on the reſt of the land his crop was leſs bulky, and ſhorter, yet very good, perhaps not leſs in the quantity of grain than the other. And here it may not be improper to mention, that when in a former year, he had ſown the two ends of a large cloſe with carrots, without dung, and the middle with turnips, for which the land was well dunged, yet, when the whole encloſure was, the next year, ſown with barley, that after the carrots was the beſt.

Another recommendation of carrots is, that our intelligent farmer finds them a more certain crop, both for growth and duration, than turnips: the latter are exceedingly apt to fail, as well as rot, towards the ſpring, when moſt wanted. Perhaps the former is, in ſome meaſure, owing to the lands in Norfolk being, as the farmers expreſs it, ſurfeited with turnips, to which they have been ſo long accuſtomed. But however this be,

there are many reaſons for chuſing both, that if one fail, we may rely, for ſo neceſſary a winter proviſion, on the other.

This candid farmer thinks he ought not, however, to conceal, that at the firſt beginning of a new ſort of huſbandry, many difficulties ſtand in the way: the expence is very heavy, much beyond the expence of turnips, and is, perhaps, increaſed by the aukwardneſs of labouring men and ſervants, who are both ignorant and perverſe about moſt new employments: beſides this, the cleaning of carrots from weeds is much more neceſſary than of turnips, and yet goes on much ſlower, ſo as ſometimes hardly to be completed: and, moreover, if a long continued froſt ſhould happen, it will be very difficult to get carrots out of the ground (indeed the turnips in this caſe are apt to ſpoil;) but this inconvenience may, in ſome meaſure, be prevented, by drawing the carrots before the froſt; though this will be attended with difficulty when the quantity amounts to fifty or a hundred loads.

Such is the account given by Mr. Billing, with regard to the culture and uſe of carrots, for the feeding of cattle. And as theſe experiments were made ſo much at large, the farmer may, without heſitation, adopt this method; and if his ſoil is adapted to the growth of carrots, he need not doubt of greatly increaſing his annual profit. That they are wholſome feed for cattle has been long known; but that ſuch advantages reſulted from their uſe as Mr. Billing relates, few farmers could have imagined.

The advantage reſulting from carrots it pretty fully ſet forth in this experiment, but would have been ſtill more obvious had Mr. Billing aſcertained the weight of his loads of carrots, and other vegetables made uſe of.

Carrots are alſo very uſeful for feeding hogs, as appears from Mr. Young's experiments on that ſubject, one of which may be proper to inſert here.

"In January 1766, ſays he, I drew from the herd ten hogs, as equal in ſize as poſſible, and weighed them alive in five lots.

		ſtone.	lb		buſhels.	ſtone.	lb
N°. 1.	weighed	13	4	eat of peaſe	16	weighed 27	6
2.		12	6	pollard	80	27	9
3.		13	0	buckwheat	27	29	13
4.		12	11	potatoes	28	25	7
5.		13	1	carrots	49	31	0

N°. 1. was fatted with white-peaſe, that weighed 66 pounds per buſhel, the price 1l. 10s. per quarter.
2. with pollard, weighed 22 pounds per buſhel, the price nine-pence per buſhel.
3. with buck-wheat, weighed 47 pounds per buſhel, price 2s. and 3d. per buſhel.
4. with boiled potatoes, weighed 54 pounds per buſhel, price 2s. per buſhel.
5. with boiled carrots, weighed 55 pounds per buſhel, raw, price 1s. 1d. per buſhel.

I thought it beſt to fix on a given ſum, as proper to fat each hog. The people I conſulted with were of opinion, that eight buſhels of white-peaſe were neceſſary to fat one ſuch hog well. This I accordingly fixed on as my criterion. The account of the expence therefore ſtands thus:

		l.	s.	d.
N°. 1.	Peaſe 16 buſhels value.	3	0	0
2.	Pollard 80 buſhels.	3	0	0
3.	Buck-wheat 27 buſhels.	3	0	9
4.	Potatoes 28 buſhels, 2l. 16s. Labour and coals 4s.	3	0	0
5.	Carrots 49 buſhels, 2l. 13s. 2d. Labour and coals, 6s. 10d.	3	0	0

each lot was weighed as ſoon as the food was done. The reſult was as appears above in the third column.

It is evident, ſays Mr. Young, from this experiment, that carrots boiled are ſuperior to any other food. I did not expect that potatoes would be ſo much inferior; but I have found from divers other trials ſince, that it is requiſite to mix the meal of ſome kind of corn with them. Pollard in this trial, as in the laſt, is ſuperior to peaſe."

The ſuperiority of carrots over potatoes in this experiment, does not conſiſt in their being more feeding than potatoes: for 28 buſhels of potatoes advanced the weight of the hogs, lot No. 4, 12 ſtone and 5 pounds; whereas 49 pounds of potatoes, the weight of the carrots made uſe of by lot No. 5, would have advanced them 21 ſtone 5 pounds, and the carrots advanced them but 18 ſtone. The reaſon of the carrots appearing ſuperior in the experiments, is on account of the price, the carrots being rated at only half the value of the potatoes per buſhel; a diſparity that ſeems too great to hold generally: for potatoes may be cultivated more extenſively than carrots can be, as they require a more particular ſoil than potatoes; and the expence of cultivating them is greater than of potatoes, particularly in the articles of hoeing, and taking up, according to Mr. Billing's experiment.

It appears likewiſe from other experiments, that as weighty crop of potatoes, or nearly ſo, may be raiſed upon an acre of land, as of carrots; and in that light the potatoes will go fartheſt in feeding hogs, which will be a pricipal conſideration with farmers, who have the option of raiſing either of theſe crops. Upon the whole, both theſe roots are highly valuable to farmers for the purpoſe of feeding hogs, as they are for feeding various kinds of cattle; in which reſpect, indeed, carrots appear to be the moſt univerſal.

Wild CARROT, *Bird's-neſt*, or *Bee's-neſt*, the name of a biennial weed common in paſture grounds. It greatly reſembles the cultivated carrot, of which indeed it is only a ſpecies. The wild ſort however differs from the cultivated in its roots, which are ſmall and ſticky. In both ſorts, after they have done flowering, the umbels contract themſelves into the ſhape of a bird's-neſt.

Carrots are very hearty and nouriſhing food for all ſorts of cattle, and very proper to feed or fatten them. They cannot, however, be brought into ſo general uſe, as ſome other roots, ſuch as potatoes, turnips, or as cabbages; unleſs they could be cultivated in ſtrong land, which hitherto has been ſuppoſed improper for them; becauſe their lateral roots are ſo very ſlender and weak, that they cannot ſpread or penetrate into ſtrong land. The ſandy ſoils are ſome of them rich, and ſuch are found to be very proper for carrots. Yet ſtrong land is generally richer than ſands,

ſands, and not only conſiſts of more minute parts than ſandy land, but is capable of a higher degree of fertilization, with the aſſiſtance of good tillage and manure. The only difficulty here is, by what means ſtrong land can be kept open, and in fine tilth, while the carrots are growing in it; for in regard to the preparation of the land, before the carrot ſeed is ſown upon it, that may be done by deep ploughing, and bringing the land into fine tilth for the reception of the ſeed. Gardeners do indeed, raiſe carrots upon different ſorts of land, ſtrong as well as light; but they do not deſire their carrots to grow large, and for that reaſon they ſow the ſeed thick, and allow their carrots to ſtand cloſe upon the ground, not uſually more than eight or ten inches diſtant from each other. They likewiſe cultivate their ground well, and deep; manure it highly, and give it ſeveral hand hoeings, which deſtroy the weeds, and looſen and improve the ſurface of the land. Theſe operations are expenſive, but are notwithſtanding neceſſary; and as we ſhall ſhew, will, with ſome variation, be very profitable to farmers, even in large concerns. A valuable inſtance of this we have in Mr. Baker's report to the Dublin Society, for the year 1771.

In 1769, and 1770, he laid a large quantity of manure upon the head lands of one of his fields, ploughed them well, and mixed the manure with the land, and then carried off all the ſtaple thus mixed, and ſpread it on the field for a dreſſing, the under ſtratum of this ground was a ſtrong poor earth, upon which he had a mind to ſow carrot ſeeds for an experiment.

"I intended, ſays he, to ſow the carrot ſeed in March, but the extreme drought and huſky winds, which we had all the ſpring of this year 1771, prevented my getting the ground into that fine order, which I conceive to be neceſſary for the reception of carrot ſeed. At beſt no one will conceive this ground to be well adapted to carrots, after having taken away the natural ſtaple. But I was inclined to try them upon my land, with an hope, that if I ſucceeded here, I might have expectations upon ſome other field of the farm; and accordingly have determined upon a field of four acres for this purpoſe, which I ſhall prepare as faſt as I can.

"As I could not ſow the ſeed, for the experiment now before us, when I intended, I rubbed a pound of it in about half a buſhel of fine riddled mould, and kept it there three weeks, with an hope that the ſeed would be ſomewhat forwarded, thereby to make it vegetate the ſooner, and to break its natural coheſion, which renders it very difficult to ſow: accordingly when I came to ſow it, I found it a good deal ſwelled, and the adheſion very much abated."

[The hairs on the borders of this ſeed occaſion it to adhere ſo cloſely, that it is impracticable to ſow it even till theſe hairs are rubbed off; which if not done before the ſeed is mixed with mould, by which it is ſwelled and ſoftened, it cannot be well rubbed afterwards to get off the hairs without damaging the ſeed; for which reaſon, the beſt way is to get off the hairs at firſt, by rubbing the ſeed once or twice through a fine wire ſieve. A ſeedſman, who can ſow turnip-ſeed well, can ſow carrot-ſeed even and alone, when thus prepared, much evener than can be done when mixed with earth, ſand, &c. becauſe ſuch mixtures being of a different ſpecific gravity from the carrot-ſeed, they fall upon the ground unequally; by which the ſeed is unavoidably ſown in patches too thick in ſome parts, and in others too thin, as happened in this caſe; though the quantity of ſeed one pound to eighteen perches, (the quantity of land of this experiment) was more than ſufficient to have ſown it all very thick.]

"On the 20th of April we had gentle rain; the 21ſt and 22d light ſhowers: I cauſed the ground to be three times ploughed and harrowed without intermiſſion. On the 22d of April I had the ſeed ſown, and buſh-harrowed the ground: after the ſecond ploughing I drew out twenty-one horſe-cart-loads of dung, ſpread it over the ground, and ploughed it in.

"I frequently looked to ſee if there was any appearance of the carrots, but to no purpoſe for a long time: at length I imagined they were coming up very thick; but behold what I took for carrots proved to be what the labourers call dog-fennel; a weed which excoriates and inflames their ſkins in harveſt where it touches. It appears to be a ſort of ſingle, or wild chamomile; however, at laſt ſome carrots were diſtinguiſhable enough; but the long continuance of dry weather prevented their going on with any vigour; and therefore, not diſtinguiſhable enough to venture the hoe among them; and that more particularly, as I have not an experienced and expert hoer.

"However, on the 28th of June I began to hoe them; for the weeds were ſo immenſely thick that the few carrots which were diſtinguiſhable, were almoſt loſt.

"The hoe we began with was a very light four inch hoe: in a moment I ſaw from the dryneſs and hardneſs of the ground, and multiplicity of the weeds, many with ſtrong roots, that this inſtrument would never do; and the clods were ſo hard as to kick them about in ſpite of the man's greateſt care, and by which miſchief was unavoidable. I inſtantly ordered an hoe to be made with a bevel edge under, and flat above; a little like an adze, two pounds and a half weight, well ſteeled and tempered like an axe, with an hammer over the eye to break the clods. It was pleaſing to ſee with what facility he cut up the weeds with ſafety to the carrots; the weight and ſharpneſs of the inſtrument, added to its particular ſet and bevil edge, gave it a power which no arm could have given to the other.

"The continuation of dry weather ſoon parched up the weeds, and the carrots looked very pert in a few days; but vaſtly too thick on one ſide of the ground, and abundantly too thin on the other, wholly from unequal ſowing.

"The rain we had on the 9th of July, and again ſome days after towards the 19th gave new vigour to the carrots; and where they were not very thick they were of a fine black green, but a new creation of weeds alſo appeared. On the 23d of July the carrots were hoed again, thinned, and ſet out as near as could be a foot aſunder: ſome of them were pulled up, moſt of them 9 and 10 inches long, quite ſtrait, but a little indented in their ſides, and about as thick as my thumb: their being indented I attribute to the extreme hardneſs of the ground from the dry weather. The 25th, 26th, and 27th, rain ſtopped the hoeing: on the 29th the hoer proceeded again; the rain ſtopped him again, and he did not finiſh this ſecond hoeing until the ſecond of Auguſt: he was four days at it, which came to three ſhillings and four-pence.

"Auguſt 20th he began to hoe them again the third and laſt time; when I had the mortification to ſee great damage had been done by ſtealing them: this hoeing took the man two days and a half at 10d. per day, amounts to 2s. 1d. They grew away at a great rate indeed; and although my crop, from having choſen improper ground, unequal ſowing, and plunder, was not large; yet I ſhall be encouraged by the attempt to proceed farther upon this farm in their culture.

"On the 8th of November I had the crop dug with three pronged forks, the common forks I found too weak for this uſe: when the carrots were brought home, I had them topped and pointed, and all the particles of dirt rubbed off, and then weighed; they weighed one ton thirteen hundred and an half; the tops and points weighed ten hundred and an half.

"It was a great pleaſure to me in the ſequel of this experiment, to find that I had many carrots after being trimmed, that weighed two pounds and three quarters: I weighed ſeveral, and I am confident there were hundreds of the ſame ſize. This fact is a great encouragement, ſince carrots of two pounds each, at a foot aſunder, will afford 63 tons an acre; a produce that it is reaſonable to imagine will bear almoſt any expence in culture.

"I ſhall now ſtate our whole expence, in order to aſcertain what theſe carrots coſt per hundred weight.

Dr. CARROTS, CULTURE, &c.

1771.		per experiment. l. s. d.	per acre. l. s. d.
April 22.	To ploughing three times as deep as poſſible,	0 1 2½	1 16 0
	To ſowing and buſh-harrowing three times,	0 1 0	0 5 0
	To drawing out 20 loads of dung, (ſay 320 loads per acre)	0 1 10	1 6 8
	To ſeed at 10d.	0 0 10	0 7 6
June 28.	To hand-hoeing the firſt time,	0 3 1½	1 8 1
July 23	To ſecond hoeing,	0 3 4	1 10 0
Auguſt 20.	To third hoeing,	0 2 1	0 18 9
September 29.	To one year's rent of 18 perches, at 18s. per acre,	0 2 0½	0 18 0
November 9.	To digging and bringing home,	0 7 6½	3 7 10
	Total for culture,	1 3 3	11 17 10
November 11.	To trimming, weighing, and putting up,	0 8 3½	3 14 7½
		£ 1 11 6½	£ 15 17 6½
	By 10½ C. of tops and points, at half the value of ſtraw, i. e. 4½d. per C. which I believe they were worth for the cattle and ſwine,	0 0 11¼	
		£ 1 7 7¼	

"Thus we ſee that theſe carrots coſt me 1l. 6s. 6¼d. which, according to our produce of 33½ C. is per C. 9¾d. If in the judgment of the reader the tops and points ſhould not be valued at any thing, which I own in my eſtimation would not be juſt in ſuch an enquiry as this, in that caſe, the carrots coſt 11¼d. per hundred weight.

"Mr. Young in his general eſtimates of the value of carrots, values them from 12 to 14 pence per buſhel; and I collect from his writings that a buſhel is about half an hundred. Now, if this valuation ſhall hold good in the general application of them for horſes, horned cattle, and ſwine, even at the price they coſt me per hundred in this my firſt attempt upon this farm, they ſurely muſt be a crop of very noble profit: however, as I believe we are not yet arrived to that exceſs of price for meat which I hear prevails in England, ſince I left that kingdom; in our culture of carrots we cannot expect to make ſo much of them as Mr. Young's experience has afforded in England: but ſuppoſe with us they ſhould be found worth twenty ſhillings a ton, the experiment now laid before the reader, even in that caſe, ſhews a profit which is very inviting.

"The produce in this experiment I conſider not half a crop, owing to late ſowing, long drought, improper ground, imperfect hoeing, irregular ſowing, (for one ſide of the ground had only here and there one) and the hand of violence; and yet the produce coſt, including all charges, only 16s. 3d. a ton. This fact I have pleaſure in laying before the public, becauſe it is an important one.

"As to the application of the preſent crop, my quantity was inſufficient to do any thing with accuracy: I ſhall only obſerve, that they have been conſumed by the ſwine in the houſe; where they are greatly preferred to any garden carrots, on account of their extraordinary ſweetneſs.

"We ſee, that including every article of the charge, that in the commencement of the carrot huſbandry upon a farm, an Iriſh acre of carrots, according to the charges incurred upon the experiment before us, will coſt about ſixteen pounds, (nearly ten pounds per Engliſh acre) I own a formidable ſum; but if the crop ſhall be worth from twenty to ſixty pounds, the expence is ſurely well laid out.

"Our

	Ton.	C.	qr.
Our acreable produce of clean trimmed carrots was	15	5	2
Of tops and points.	4	14	2

It appears from this experiment, that carrots will thrive well in ſtrong land, if properly prepared for them; a circumſtance of great importance to farmers, as they may obtain good crops of this valuable root on moſt ſorts of land, whether ſtrong or light, provided the land is dry, or free from ſprings.

The culture of theſe carrots was very expenſive, particularly the hand-hoeing, which coſt 3l. 16s. 10d. though only about half the land was planted; and is at the rate of near 2s. 8d. per acre for hand hoeing; whereas had theſe carrots been drilled in rows a foot aſunder, the hoeing would not have coſt above one third of that ſum; and leſs than half the ſeed ſown here would be ſufficient to drill.

But as a good depth of mould is a material conſideration in the culture of carrots, it is much better to drill the ſeed upon ridges than upon level ground: I have found upon trial that excellent carrots may be raiſed upon a ſtrong loam, ploughed into three feet ridges, one row upon each ridge horſe-hoed; but ridges about four feet broad are better; for they may be trench-hoed or to the depth of two furrows; by which it is obvious the carrots will grow to a great ſize, much larger than they can be advanced to by hand-hoeing, and upon level ground, and, which are material conſiderations, at a leſs expence, and the land more improved than by any other method of culture. Many of Mr. Baker's carrots were two pounds and three quarters each; and if upon four feet ridges, and ſix inches diſtant in the rows, this is two carrots upon every four ſquare feet of ground, which weighing three pounds each, is above twenty-nine tons per Engliſh acre.

That this eſtimate is a very moderate one, may appear from what Mr. Young relates, "that from light ſandy loam, or rather abſolute ſand, ſo looſe that a ſhovel with very little force would penetrate into it a yard deep, carrots were raiſed upon this ſoil, which when taken up in October, ſome of them were as large as the body of a quart bottle, very long and ſtraight; and they had often upon this land from twenty to twenty-four loads on an acre, each forty buſhels." *See the Farmer's Letter's p.* 216. A buſhel of carrots weighs about half a hundred weight, or 56 pounds; ſo that theſe crops were from 20 to 24 tons of carrots upon an acre, a very valuable crop obtained by hand-hoeing. It is a circumſtance of great encouragement to farmers to cultivate carrots, conſidering that they may obtain as large crops of them upon poor ſtrong land, as from ſuch rich ſand as Mr. Young mentions here; and that even greater crops may be had from ordinary land, and at a leſs expence by the horſe-hoeing culture.

The whole expence of this culture, viz. horſe and hand-hoeing, will not amount to half the coſt of hand-hoeing in Mr. Baker's method; with this further advantage, that by deep ploughing the earth from one ſide of the rows, the carrots may be drawn up eaſily with a fork, or even by hand, at a very ſmall expence; and one pound of ſeed is more than ſufficient to drill an acre; for by ſome trials I found that a pound of carrot-ſeed rough, (or before the hairs were rubbed off) evenly ſown broad-caſt will furniſh full ſixty ſeeds to every ſquare yard of land. If therefore this ſeed is drilled upon four feet ridges, a ſingle row upon each ridge, every two feet and three inches length of the ridge contains a yard ſquare of ground, upon which 60 ſeeds being drilled, they will not lie quite half an inch in the row; and every ſix inches length of row will have 13 ſeeds in it, and only one carrot is neceſſary in 6 inches to produce the above crop.

Carrots are of ſingular uſe to farmers, being very nouriſhing food for all ſorts of cattle, which are all fond of them. In Mr. Billing's experiment upon carrots, he takes notice that in feeding his cattle with them, he found that two loads of carrots went nearly as far in feeding them as three loads of turnips; and they are not only a ſurer crop, and liable to fewer accidents, but alſo more proper to be ſtored for feeding cattle in winter and ſpring than turnips; but the turnips do not occupy the land ſo long.

CAR-SICK, a term uſed in ſome of the northern counties to ſignify the cart-rut, or gutter made by the wheel of a cart or waggon.

CART, a vehicle mounted upon two wheels, and drawn by one or more horſes.

The chief difficulty in the conſtruction of wheel-carriages, conſiſts in properly adapting the wheels and axle, which ought to be done in ſuch a manner, that the carriage may move with the leaſt force poſſible. *See the article* WAGGON.

CART-LODGE, a ſmall out-houſe for ſheltering carts, waggons, &c. from the weather.

Farmers ſhould be very careful to place their waggons, carts, &c. under proper ſhelter, when out of uſe, as they will laſt twice as long by this means, as they would if expoſed in the yard to all weathers; for as they are thus ſometimes wet, and ſometimes dry, they ſoon rot, and become unfit for uſe.

CART-LADDER, a kind of rack, placed occaſionally at the tail of a cart or waggon, to make it hold the larger quantity of hay, ſtraw, &c.

CART-RAKE, the cart-track, or furrow made by the wheels of a cart or waggon.

CART-RUT, the ſame with cart-rake. *See the preceding article.*

CARTWRIGHT, a perſon whoſe buſineſs it is to make carts, waggons, &c. generally called a wheelwright.

CARUE, or KERUE, ſour. Thus to carue, ſignifies to grow ſour, and is generally applied to cream.

CARUNCLE *of the eye*, the fleſhy ſubſtance in the inner corner of a horſe's eye, next the noſe.

CASINGS, or COW-BLAKES, dried cows dung, uſed in ſeveral parts for fewel.

CAST, a flight of birds, inſects, &c. Thus a caſt of bees, ſignifies a ſwarm or flight of bees.

CATCH-LAND, a name given to ſuch land as is not certainly known to which pariſh it belongs; and therefore the miniſter, who firſt gets the tithes of it, enjoys it for that year.

CATERPILLAR, a general name for all inſects of the butterfly kind, while they continue in their reptile or worm ſtate.

It is well known, that all winged inſects paſs through a reptile ſtate, before they arrive at perfection. This

great

great change from a worm to a fly, or butterfly, was formerly eſteemed a real metamorphoſis, or change of one animal into another; but later diſcoveries have put it beyond all doubt, that the embrio butterfly, with all the lineaments of his parent, is contained within the external caſes, or coverings of the caterpillar. When the included animal has acquired a ſufficient degree of ſtrength, theſe coverings are thrown off, and it appears in its genuine form of a fly, or butterfly. It muſt, however be obſerved, that before the creature can free itſelf from theſe coverings, it muſt paſs through a ſtate of reſt, called by naturaliſts nymph, or chryſalis ſtate.

Mr. Hitt obſerves, that there are two ſorts of caterpillars, at leaſt thoſe of two colours, which feed upon fruit trees, the one black, and the other green. The black generally make their appearance in March, if the ſeaſon be dry, upon the pear, apple, and ſeveral other trees.

Sometimes great numbers of them are contained in a ſort of kel, or web, and, if they are to be come at, ſhould be taken off; for otherwiſe they will diſperſe themſelves to all parts of the tree, and there feed upon the bloſſoms, leaves, or their buds, before they are unfolded. After they have lived ſome time in this active ſtate, they gerally conceal themſelves in a bunch of leaves, or in a cavity of the rind of a tree, where many of their eggs are hatched the ſame ſummer, and become very deſtructive. There is alſo reaſon to think, that ſome of their eggs are preſerved in thoſe places during the winter, as many of them, and ſome kindled or animated, have been found in old nail holes, and under pieces of dead bark, during the month of February.

The walk ſhould therefore be well waſhed, and the dwarfs and ſtandard trees well dreſſed and cleanſed at that ſeaſon.

The green caterpillars, which may, perhaps, be the ſame with the former at their firſt appearance, till their colour is gradually changed by living wholly on green food, are never ſeen ſo early in the ſpring as the former; but are very prejudicial to both the young branches and fruit of the apricot, cherry, plumb, apple, pear, currant, gooſeberry, &c.

They are never ſeen in great numbers together incloſed in a kel or web; but are generally found ſingle, wrapt up in the extremity of a new made branch of the abovementioned trees, or in a bunch of bloſſoms of an apple, pear, or cherry-tree, and ſometimes on an apricot, with a leaf to cover them. Part of their bad effects may be prevented in wall-trees, or dwarfs, whoſe branches are within reach. If they be at the extremity of a branch, it will appear in a round knob, and they generally eat off the part they had wrapt together, which ſpoils the branch the next year. When they have incloſed themſelves in a bunch of bloſſoms, or young fruit, then they prove very deſtructive, by generally eating into all they had joined together, which cauſes much fruit to drop off ſoon after, and others when they are more grown.

Some of thoſe which are but ſlightly eat, will continue upon the tree till the time of gathering; but they never make good fruit, being generally ill taſted, and many times have a white grub within them.

When the caterpillars are firſt perceived upon the wall or dwarf trees, whether before or after they are wrapt up, a brine ſhould be prepared, and the trees ſwept all over with a bruſh or beſom dipt in it. This will deſtroy many of the inſects, by beating ſome off, and killing others; This work ſhould be often repeated, if there be a neceſſity for it, as there generally is in dry ſeaſons. Perhaps a ſmall engine would be the propereſt and moſt effectual inſtrument for this work.

But gentlemen, who have leiſure ſufficient, may eaſily preſerve their fruit-trees from the ravages of caterpillars, by carefully inſpecting them every day in the ſpring; for it will eaſily be ſeen when a bunch of bloſſom-leaves, or young fruit, are joined together by a caterpillar; and, on the firſt diſcovery, the leaves are to be ſeparated by the hand, aud the caterpillars killed; this will ſave a young branch or bunch of fruit, which would otherwiſe have been certainly deſtroyed. Whoever perſeveres in this work will never have much of their fruit deſtroyed by ſuch inſects, which experience has ſufficiently demonſtrated to be more deſtructive to the fruit than any other cauſes that happen in the ſpring, though many will attribute the ſcarcity of fruit to blaſts or lightnings, or to the branches being ſun-burnt, which are the common conſtructions put upon the effects of theſe inſects.

When ſtandard trees are properly ordered with cutting and dreſſing, they will not be much ſubject to be infected with caterpillars; for by taking off the old rind, and cleaning the cankered parts of thoſe trees, many of the inſects are deſtroyed, together with their eggs concealed in thoſe places; and by keeping the branches thin and open, they are more eaſily ſhaken off by the winds. *Hitt on Fruit-Trees, p.* 265.

Caterpillars not only deſtroy the leaves and bloſſoms of fruit-trees, but they alſo deſtroy cabbages, and other productions of the garden; and are generally the effect of great drought.

To prevent their numerous increaſe on trees, gather them off in winter, taking away the prickets, which cleave to the branches, and burn them; but if they get on cauliflowers or cabbages, take ſome ſalt water, or ſtrong brine, and water the plants with it, and it will kill the inſects: the ſame effect may be produced by taking ſome of the caterpillars themſelves, bruiſing them with garlic, and infuſing the mixture in water; or you may ſmoke them with wiſps of dry ſtraw in March, juſt as the bud begins to open.

In the ſummer while they are yet young, when, either through the coldneſs of the night, or ſome humidity, they are aſſembled together on heaps, you may take and deſtroy them; or you may waſh your trees with water, in which worm-wood, tobacco-ſtalks, and coloquintida have been diſſolved; or take lime-duſt, and when the wind is high, and the trees wet, ſprinkle the duſt, ſo that the wind may blow it on the trees. *Mortimer's Huſbandry, vol.* I. *p.* 325.

CATKINS, a name given to ſuch flowers as have an aggregate of ſummits hanging down, in the ſhape of a rope, or cat's-tail.

CAT's-FOOT, a name given in ſome countries to ground-ivy.

CAT's-TAIL, a round ſubſtance growing upon nut-trees.

CATTLE, a general name for beaſts of paſture, that are neither wild nor domeſtic; but generally confined to thoſe of the ox kind.

Cattle are known to be very advantageous to the breeders of them; and therefore thoſe in middling fortune would

would do well to apply ſome part of their time and farms to this uſeful work: but people in theſe circumſtances, finding it impracticable to make large profits, too often reject, with diſdain, the ſmall advantages continually in their power. In vain the wiſe man informs them, that whoever neglects ſmall profits will daily decay; in vain reaſon dictates, that from a ſmall ſtock, they muſt be contented with ſmall gain; but that a great number of ſmall profits, which it is eaſy to multiply by labour, becomes in a ſhort time an object of conſideration.

It muſt not however be imagined, that in order to derive a conſiderable advantage from cattle, it will be ſufficient to have a great number, and to give them the neceſſary fodder: there are many other circumſtances to be attended to, without which it would be in vain to flatter ourſelves with the expectation of riches. They are often kept in too narrow a cow-houſe, from whence many inconveniencies ariſe. Sometimes they fight, and wound one another. The moſt voracious ſtarve their neighbours, from whom they carry off all the fodder within their reach; and the injured cows decay inſenſibly, become languid, or give little milk. In ſummer the heat incommodes them, a circumſtance which makes them grow lean, and diminiſhes the quantity of their milk. Care muſt therefore be taken that they have ſufficient room in their ſtalls; that they be cool in ſummer, and warm in winter. At all ſeaſons let them be dry, for that is a material point. Even in ſummer, humidity is diſagreeable to them, and in winter it chills them. To prevent this double inconvenience, it will be proper to pave the cow-houſes on a gentle deſcent, and to dig a pit to collect all water and ſtale. By this means the cattle will lie always dry, and the ſtale be collected for good purpoſes. Horned cattle ſometimes contract a habit of licking one another; and that injures ſo much, that a butcher who perceives it, will give leſs money for them than for others. They are cured of this habit, by rubbing the places they have licked with cow-dung, the bitterneſs of which prevents them from purſuing it.

We ſhall inſiſt on the advantages attending the breeding of young cattle, whatever trouble it may coſt, becauſe there is no prudent countryman who is not fully perſuaded they are real. To buy what he may have of his own growth is to a farmer no acquiſition, but a diſſipation; becauſe the land produces no money, which is only to be obtained by the ſale of commodities, and very often the purchaſe of ſome goods deſtroys all the profit reſulting from the ſale of others. It ought, therefore, to be an inviolable maxim, eſpecially with thoſe in narrow circumſtances, to ſpare no pains in improving their ſtock, not making ſmall eſtimation of what has coſt them no money, but frugal as if they had bought it. By this means, if we except unforeſeen accidents, which can never be prevented, they will find wealth flow in upon them annually, though ſlowly, and lay the foundation of a ſolid fortune. *Journal Oeconomique.*

Fattening and feeding CATTLE. Cattle are bought in to fat at ſpring, and about Michaelmas. Thoſe you buy in at ſpring will be fat in July, Auguſt, or September, according as they are forward, and you have keeping for them; and thoſe which you buy in Auguſt, September, or October, muſt be either to ſell in winter or in ſpring, and muſt be forward in fleſh to be improved the beginning of winter, and only kept up in fleſh during the hard time of winter, either with burnet-hay, turnips, carrots, &c. to be fit for a good market whenever it offers; or they muſt be young lean cattle, that may by their growth pay for their wintering, and to be fit to fat the next ſummer. Some upon ordinary land buy in young Welch heifers, which, if they prove with calf, they ſell in ſpring, with a calf by their ſide for the dairy; and thoſe that are not with calf they fatten: all which ways turn to good account, according as prices fall out; but moſt commonly all meat, either at Chriſtmas or in the ſpring, is one third part dearer than in ſummer: becauſe all have not the conveniency either of hay, turnips, &c. to fatten cattle with in winter; and it is but in a few places, eſpecially near London, which is the chief market for fat cattle, that hay can be afforded to fatten them with; for they reckon an ox that coſts about ſix pounds, will require about two loads of hay to keep him up all the winter.

For the wintering of cattle, you muſt about September turn out them you deſign to keep up for a winter or a ſpring market, and your cows, that give milk into your rowens, till either ſnow or a hard froſt comes on, as by that means they will need no fodder; but when either ſnow or froſt comes, you muſt give hay to ſuch cows as are near calving, or thoſe that have lately calved, or that give a great deal of milk, and alſo to your fattening cattle. This muſt be done every morning and evening, in proportion to the quantity of rowen you have upon the ground; for the more rowen you have, the leſs quantity of hay will do, and even the ſour graſs which your cattle would not eat before, will, when the froſt hath taken it, become good, ſweet food for them, and what they will eat with pleaſure, if it be not covered ſo deep with ſnow, that they cannot come at it. But for your lean cattle, and thoſe that give but little milk, ſtraw will do well enough to fodder them with; only you muſt obſerve to give barley-ſtraw firſt, and the oat-ſtraw laſt, except you value your milk: if you do, give ſuch cows your oat-ſtraw, provided the quantity of milk they give doth not deſerve hay, or hay be ſcarce with you; for barley-ſtraw will quite dry up the little milk they have, tho' it is good food for dry cattle. But if your hay and carrots fail you, pour ſcalding hot-water upon your malt-duſt, and, when near cold, give it the cows you deſign to continue the milk of, and it will cauſe them to give a great deal, though they eat ſtraw with it. A buſhel, which coſts about three-pence, will be ſufficient for a cow in a week. But about London, where they have grains in plenty, they give them to their cows in winter, which makes them give a great deal of milk; but is apt to rot them, if given in too great quantities, and for too long a time.

When your rowen is quite eaten up, which will commonly be about February, you muſt houſe your milch-cows, which you give hay to all night in your cow-houſe, and your other cattle in your yard; for which uſe you ſhould have two yards; one for your cattle which eat ſtraw, with racks and other conveniencies to fodder them in: obſerving to feed them often, and not to give them too much at a time; becauſe when they have blown upon it, they will not eat it; both your yards ought to be well ſheltered, and made as dry as poſſible, and a good deal of ſtraw given them to lie dry and warm in, which is a very great advantage to them, and will greatly increaſe the quantity of your dung.

As to the buying of fat cattle, milch-cows, or lean cattle,

cattle, experience, and the advice of ſuch perſons as underſtand them are the beſt inſtructors.

For the feeding of land, you may do it with beaſts and horſes together, or with beaſts firſt, and horſes afterwards; and after both put in ſheep. But let not your graſs be too rank before you feed it; for if you do it will be ſour, and your cattle will eat the tops only, ſo that the other part will lie untouched, and rot upon the ground, as hardly any beaſt will eat ſour graſs, till the froſt hath taken it, except Welch heifers. Obſerve alſo, where you have incloſures, to be often changing of your cattle from one paſture to another; for by that means you will give your land an opportunity of getting a freſh head, freſh graſs being a great help to the feeding of cattle. *Mortimer's Huſbandry, vol.* I. *p.* 231.

Cattle are frequently well fed in the winter with rye-ſtraw, mixed with a little hay; with the ſtraw or halm of buck-wheat; with the leaves of white beet; with turnips, the turnip-cabbage, carrots, cabbages, burnet, and the bruiſed tops of furze; as may be ſeen under each article. They are alſo well fed and fatted with the cakes of linſeed and rape-ſeed, or cole-ſeed. *See the articles* COLE-SEED *and* LIN-SEED.

It is really ſurpriſing that though plants have been conſtantly obvious to the eyes of every man, nothing has been delivered down to us in any book, concerning the kinds of plants proper for the different kinds of cattle; the conſequence of which inattention frequently is, that the farmer, by not diſtinguiſhing and ſelecting the ſeeds or proper graſſes, fills his paſtures with weeds, or, which is here equivalent to them, with bad graſſes, unfit for the nouriſhment of the animal he intends to rear.

The illuſtrious Linnæus in his journey through Dalecarlia in the year 1734, made the firſt attempt to lay down rules for the farmer's direction in this intereſting ſubject. In his journey he obſerved, that the horſes eaſily diſtinguiſhed wholeſome from noxious food; for, being very hungry, they devoured all ſorts of plants, except the meadow-ſweet, valerian, lilly of the valley, angelica, looſe-ſtrife, marſh-cinquefoil, crane's-bill, hellebore, monkſhood, and ſeveral ſhrubs. This gave him a hint to recommend to the curious to apply themſelves to examine what plants ſuch animals as live on vegetables will not touch.

The ingenious author of the Swediſh Pan, in order to encourage inquiries of this kind, very properly obſerves, that we admire the wiſdom of the Creator, which has made ſome vegetables abſolutely diſagreeable to ſome animals, while they are agreeable to others; and plants, which are poiſonous to ſome, are wholeſome to others. This did not happen by chance; it was ordained for wiſe purpoſes: for if the Author of nature had made all plants equally grateful to all kinds of quadrupedes, it muſt neceſſarily have happened, that one ſpecies of them having remarkably increaſed, another ſpecies muſt have periſhed by hunger, becauſe it would have got into better paſture. In like manner we find it contrived in relation to the plants themſelves, which do not all grow in the ſame country and climate; but every plant has its place, in which it grows more abundantly than elſewhere. From hence we may obſerve, that thoſe animals which live chiefly upon particular plants, abound moſt in certain places. Thus one animal leaves that which is poiſonous to itſelf, for another animal, which feeds upon it deliciouſly. Long-leaved water-hemlock will kill a cow, whereas the goat browſes on it greedily. Monkſhood kills a goat, but will not hurt a horſe. Parſley is deadly to ſmall birds, while ſheep, hares, rabbits, and ſwine eat it ſafely; and pepper is mortal to ſwine, and wholeſome to poultry. Hunger will often drive animals to feed upon plants which nature never intended for them: but after this has happened once, they become more cautious for the future.

Perhaps many of the terrible diſeaſes to which cattle are ſubject, and which has ſwept away innumerable multitudes, may, in part at leaſt, be owing to the mixture of noxious plants among their food. The great Linnæus was of this opinion; and the following paſſage in the writings of that admired naturaliſt is too intereſting to be omitted in a work of this kind.

"When I arrived, ſays he, at Tornea, the inhabitants complained of a terrible diſeaſe then raging among the horned cattle, which died by hundreds, ſoon after their being let into the paſtures in the ſpring. They deſired I would conſider this affair, and give them my advice what was to be done, in order to put a ſtop to this evil. After a proper examination, I thought the following circumſtances worth obſerving:

"1. That the cattle died as ſoon as they left off winter fodder, and returned to grazing.

"2. That the diſeaſe diminiſhed as the ſummer came on; at which time, as well as in the autumn, few died.

"3. That this diſtemper was propagated irregularly, and not by contagion.

"4. That in the ſpring, the cows were driven into a meadow near the city, and that they chiefly died there.

"5. That the ſymptoms varied much, yet agreed in this; that the cattle, in grazing indiſcriminately on all ſorts of herbs, had their bellies ſwelled, were ſeized with convulſions, and in a few days expired with dreadful bellowings.

"6. That no man dared to flay the recent carcaſſes; as they found by experience, that not only the hands of ſuch as attempted it, but their faces too, had been inflamed and mortified, and that death had enſued.

"7. The people enquired of me, whether there were any kind of poiſonous ſpiders in that meadow; or whether the water, which had a yellowiſh tint, was not noxious.

"8. That it was not a murrain was clear, becauſe the diſtemper was not contagious, and becauſe that diſtemper is not peculiar to the ſpring. I ſaw no ſpiders but what are common all over Sweden; and as to the water, the ſediment at the bottom, which cauſed the yellowneſs, was nothing but what came from iron.

"9. I was hardly got out of the boat which carried me over the river into the meadow, before I gueſſed the real cauſe of the diſeaſe; for I there beheld the long-leaved water-hemlock. My reaſons for gueſſing this were the following:

"10. Becauſe in that meadow where the cattle firſt fell ill, this poiſonous plant grows in great plenty, chiefly near the banks of the river. In other places it was ſcarce.

"11. The leaſt attention will convince us, that brutes

brutes ſhun whatever is hurtful to them, and diſtinguiſh poiſonous plants from thoſe which are ſalutary, by natural inſtinct; ſo that this plant is not eaten by them in the ſummer and autumn, which is the reaſon that few cattle died in theſe ſeaſons; thoſe only which eat of it by accident, or were driven to it by extreme hunger.

"12. But when they are let into the paſtures in the ſpring, partly from their greedineſs after the herbs, and partly from the hunger they had undergone during the winter, they devour every green thing that comes in their way. It alſo happens that herbs, at this ſeaſon, are ſmall, and ſcarcely ſupply food in ſufficient quantity. They are beſides more juicy, and covered with water, and ſmell leſs ſtrong; ſo that what is noxious is not eaſily diſcerned from what is wholeſome. I obſerved likewiſe, that the radical leaves were always bitter, and the others not, which confirms what I have juſt ſaid.

"13. I ſaw this plant in an adjoining meadow mowed along with graſs for winter fodder; and therefore it is no wonder, that ſome cattle, though but a few, ſhould die of it in the winter.

"14. After I left Tornea, I ſaw no more of this plant, till I came to the vaſt meadows near Limmingen, where it appeared along the ſides of the road; and when I got into the town I heard of the ſame complaints as at Tornea, of the annual loſs of cattle, with the ſame circumſtances.

"15. It would therefore be worth while to eradicate carefully theſe plants, which might eaſily be done; as they grow on marſhy grounds, and generally by the ſides of pools and rivers. But if this cannot be performed, the cattle ſhould not be ſuffered to go into ſuch places, at leaſt during the ſpring: for I am perſuaded that later in the year they can diſtinguiſh this plant by the ſmell alone." *Lin. Flora Lapponica.*

Were experiments carefully and judiciouſly made on the above beneficial plan, we ſhould ſoon know with certainty what ſpecies of animals any paſture affords the beſt nouriſhment for. We ſee, for example, heifers fall away in encloſures, where the meadow-ſweet grows in abundance, and covers the ground ſo that they can hardly make their way through it: while the country people, imagining that the paſture is too rich for them, are quite amazed, and never dream that the meadow-ſweet affords them no nouriſhment: whereas the goat, which ſtands bleating on the other ſide of the hedge, is not ſuffered to go in, though he longs to be browſing upon this plant, which is to him a moſt delicate and nouriſhing food. Long experience has taught us, that ſheep take up poiſon in marſhy grounds, though no one till lately knew what the particular poiſon was: yet the ſpider-wort, the mouſe-ear ſcorpion-graſs, the mercury, the ſun-dew, the hairy-wood-graſs, the leſſer ſpear-wort, and the butterwort, have evidently ſuſpicious marks.

Hence we ſee, that what makes low grounds ſo noxious to ſheep is not wholly the moiſture, but the plants which grow there; for it is remarked by ſhepherds, that the great danger to ſheep is immediately after a freſh ſpring of graſs, when it is natural to think they lick up the young and tender ſhoots of poiſonous plants along with their proper food, not being then able to diſtinguiſh the one from the other.

From the obſervations of this kind the huſbandman may form a right judgment of his meadows, and turn into each the animals beſt adapted to the nature of the paſture.

"The induſtrious farmer, ſays the author of the Swediſh Pan, may judge from hence, when he ſows his meadows with hay-ſeeds for paſture, that it is not indifferent what kind of ſeeds he chooſes, as the vulgar inadvertently think: for ſome are fit for horſes, others for cows, &c. Horſes are nicer in chooſing than any of our cattle. Plants, whoſe ſeeds grow in pods, are particularly reliſhed by them. Goats feed upon a greater variety of plants than any other cattle: but then they chiefly hunt after the extremities and flowers. Sheep, on the contrary, paſs by the flowers, and eat the leaves. And again, different animals have different diſpoſitions as to grazing more or leſs near the ground. The huſbandman, who underſtands theſe things, and who, in conſequence thereof, knows how to lay out his lands, ſo as to aſſign to each ſort of cattle its proper food, will neceſſarily have his flocks and herds healthier and fatter, than he who is unacquainted with theſe principles. The good manager will alſo obſerve the ſame precautions in the making of his hay: for although many herbs are eaten when dry, which would be refuſed while green, it does not from thence follow, that they yield good nouriſhment. Much might be added concerning the propenſity of cattle to this or that plant: for example, that ſheep delight above all things in the feſcue graſs, and grow fatter upon it, than on any other kind of graſs; that goats prefer certain plants, but, being led by an inſtinct peculiar to themſelves, they ſearch more after variety, and do not willingly ſtick long to any one kind of food; that geeſe are particularly fond of the ſeeds of feſcue graſs; that ſwine hunt greedily after the roots of bullruſh, while they are freſh, but will not touch them when they are dry." *N. Haſſelgren. Amœnit. Academ. Suec. tom.* II.

If a farmer, ſays the intelligent Mr. Liſle, intends to graze cattle in a hill country farm, theſe three things are eſpecially to be regarded; firſt, to raiſe a good quantity of French graſs for hay and aftermaths. Secondly, to turn a good quantity of hill country meadow into rich paſture, by feeding it, dunging it, and laying on it other manure, to make it fit for raiſing the bullock or heifer in the ſpring, when he comes firſt from hay into graſs-leaſe, and to receive him with a vigorous aftermath, when other graſſes, as clovers, and French graſs aftermath, goes off. Thirdly, to have hovels in your bartons, incloſed with cloſe court-walls, to ſhelter your cattle in the winter from wind and rain. All theſe three things are neceſſary and uniform, correſponding with one another; without them, grazing muſt be carried on very defectively, and to little profit, by the hill country farmer.

By the methods here preſcribed, in order to the fattening of cattle, plenty of French graſs hay will enable the grazier to purchaſe barren beaſts before the ſpring graſs comes, when it is moſt likely they will be cheap, and may be bought to the beſt advantage, allowing the value of the hay they may eat in conſideration with the purchaſe; and if by winter-hayning ſome meadow-ground (after it has been kept high in heart, by feeding and ſoiling it) you can early in the ſpring, by April, or ſooner, have a bite to take off ſuch grazing beaſts from hay to graſs, it will be very advantageous before clovers

can be ready, which are ſeldom ſo, in the hill-country, till a week or a fortnight in May; and by hayning up ſuch meads for an aftermath, which towards the end of ſummer are in very good heart, you will ſupport your bullock, and carry him on when the ſpirit of other graſſes fail. Then ſuch cattle as are unfiniſhed being brought to French graſs hay, and tied up under hovels or coverings, and within court-walls, will proceed in thriving by being ſecured from the wind and rain, and the tedious hill-country-rimes, that often continue whole winter days, all which makes cattle brought from graſs to pitch, and maſhes them out. Beſides, if you have not plenty of French graſs hay, you cannot make the beſt of a milch-cow that warps, or of a cow that towards the latter end of winter you may perceive proves barren, or of a fat cow that caſts her calf before you kill her. The neceſſity of French graſs hay only, and not of clover hay, is mentioned here, becauſe it is ſuppoſed that the hill country farmer, who provides ſtore of French graſs hay, will be wiſe enough not to mow his clover to feed them, in order to improve his lands; for the hill-country farmers have generally ſo much land for their money, that all they can do is little enough to keep their arable land in ſuch heart as it ought to be in for their profit.

If the foregoing cautions are not obſerved, the ill conſequences that will follow muſt be ſuch as theſe: if the firſt of the three foregoing cautions be diſregarded, your cattle cannot at any time of the year be made fat, as they ought to be, and then you muſt be under the neceſſity of ſelling them half fat, of which neceſſity the buyer never fails to take the advantage; and ſell them you muſt, notwithſtanding there be ever ſo fair a proſpect of prices riſing in a month or two; and you will commonly find, that you have nothing for the meat they have eat whilſt they have been fattening. In the ſecond place, we will ſuppoſe that very few will be ſo unwiſe, as to begin to fat a beaſt in October with hay, and ſo to keep him upon hay during the winter: but we may reaſonably ſuppoſe, that warping beaſts, barren heifers, &c. may, and commonly are begun to be fatted with hay from Chriſtmas, in which caſe, though hay be plenty, yet if an early ſpring-graſs be wanting, ſuch cattle muſt be kept on it at leaſt till the middle of May; for till then, in the hill-country, it will not give a beaſt a bite, and then commonly, where the maſter is at a loſs and diſappointed, the cattle evidently ſuffer before he can make the moſt of them, and, in this caſe, he will find a beaſt plainly pitch before he can find a purchaſer for him. Again, if early ſpring-graſs be wanting, you cannot begin ſummer-fattening of cattle, nor buy a barren heifer till towards the middle of May, and then they are commonly very dear: and, in the hill-country, from ſo late a beginning, the ſummer graſs will hardly fat a beaſt, the ground falling early off its ſtrength, being generally poor. And then, if you have not a quick growing aftermath treaſured up, by keeping ſuch ground as was formerly meadow in good heart for that purpoſe, it is plain you muſt again run into the firſt evil; and, if you have ſuch an aftermath, you may again often want hay in November and December, to finiſh ſummer fatted beaſts; ſo that plenty of hay is always neceſſary, &c. And, laſtly, though you have both hay and graſs, if you want winter ſhelter, the cattle muſt ſuffer.

All fattening cattle, whether lambs, ſheep, barren cows, or oxen, require a proportionable progreſſion from coarſer to better food, as they grow more and more into good fleſh; otherwiſe when half fat they will go back, and you will not without great difficulty raiſe them again, which will be a great loſs; nor will ſuch beef ſpend kindly.

A gentleman, who would make a good hill-country grazier, ought, againſt the time he buys in his heifers to take care to be provided with an overplus ſtock of middling good hay, or of winter vetches, or of barley ſtraw, and autumn graſs, mixed together, layer and layer of each. Be it what it will, it ought to be at leaſt better than barley-ſtraw; for he is to ſuppoſe he has bought barren heifers, which have been kept all the winter upon ſtraw: if they have been kept better, for inſtance, on ſtraw and rowet, there is ſtill the greater reaſon for him to mend their keeping; and he is, from the time of buying, to conſider, that he ought to begin to raiſe them in fleſh; for the better caſe they are in when turned to ſpring-graſs, they will take to fattening the kinder, and bear their firſt ſcouring the better. If he could turn them into the field, for an hour or two in the day, where there is a little rowet, it would do well, and to have change of the above dry meads would keep them the better to their ſtomachs.

Oxen are turned off to fattening at two ſeaſons of the year, which, in ſeveral reſpects, are very convenient. The firſt is about May-day, when the labour of the ox is pretty well over for the ſpring ſeaſon, the ſpring corn being then generally all ſown. The ſecond is the beginning of winter, namely, from the firſt of October, to the middle of November, when the wheat and winter vetches are generally all ſown, and the ploughman's hurry relaxes.

Oxen turned out at May-day will hardly get fat before Chriſtmas, and if not turned out till June, will not be fat till March, April, or May; which again falls out very fortunately, becauſe from Chriſtmas until the latter end of May cow beef is very ſcarce, and is generally ſupplied with ox beef; but then it is obvious, when an ox gets half, or three quarters fat by or before winter, he muſt be ſupported and carried on by a great quantity of hay, and that very good, for the beaſt will then grow nice.

Thoſe that are turned from the plough in October and November, ordinary food will ſerve for ſome time; for ſhould you lay the beſt hay before ſuch an ox, then hungry and poor, he will devour more than the profit. The moſt you can propoſe by this method is to get him fat by July, inſtead of September or October; during all which interval of time, heifer-beef will be plenty, and ſink the price of ox-beef; ſo chargeable a method therefore will not quit coſts.

What the grazier ought to do in this caſe is to bring his ox eaſily and gently into good fleſh by a rowet; for which purpoſe he ought to have hayned up his grounds, and of which rowet he ſhould give him the worſt firſt, except it be of ſo ſour a kind as to want the correction of the winter froſts before he will eat it, of which kind ſtubble rowet commonly is, and in ſuch caſe that food muſt be reſerved till then, or rather for young beaſts and milch-cows. He ought to give him variety of dry meat along with his rowet, in which he ſhould conſult his tooth, by flinging before him, alternately, every ſort of

good

good ſtraw, giving now and then a lock of winter vetches, or coarſe hay, but of every thing good in its kind, *i. e.* ſweet and well made; and thus the ox ought to be carried on throughout the winter. About the beginning of March he ought to have better hay; not only becauſe the rowet may be ſuppoſed to be all gone, but alſo becauſe the ox, mending in fleſh, grows nicer and will be weary of dry meat, through the tedioufneſs of being foddered ſo much with it during the winter; therefore his hay muſt be mended, for not proceeding is going back. Againſt April, if poſſible, a ſhort head of graſs ſhould be got for him in your paſture grounds for cow-cattle, by hayning the paſture in February, that he may have graſs along with his hay, as was before obſerved in the fattening of barren heifers; and againſt May a head of hop clover muſt be in readineſs, in the hill country, to receive him into his firſt full grazing; for it is not to be ſuppoſed that the meadows of the hill country, which according to this ſcheme are to be converted into paſture, can be fit before the firſt of June to entertain a grazing ox; and it is alſo to be noted, that in the hill-country, in the month of May, hop-clover will not afford a good bite for an ox or cow, unleſs the autumnal bud be hayned, and preſerved by being fed by ſheep: in in the month of May, if it ſhould prove a dry ſpring, the fattening oxen and cows muſt alſo have good hay given them, with their hop-clover, if it be ſhort.

Fattening in the hill-country, eſpecially if you give your cattle hay in the winter, is more chargeable than in the vale; not only becauſe hay is dearer there, but alſo becauſe the winter ſeaſon begins a month ſooner, and continues a month later in the former than in the latter. The farmer in the hill country muſt likewiſe, by forcing nature as it were, provide rowet and ſeveral ſorts of graſſes in their due order, exactly accommodated to the ſeaſon of the year, beſides winter meat, &c. Whereas all may be procured by the latter in the natural courſe, with very little care and trouble.

It will be neceſſary to obſerve, that every hill-country grazier goes to work without his tools, who does not lay down from fifty to an hundred acres of land proper for it, with French graſſes, not only on account of making up the deficiency of the meadows not laid down to paſture, being converted to other uſes, but alſo to anſwer many other demands. *Liſle's Obſervations in Huſbandry, vol.* II. *p.* 18.

A ſtalled ox in the winter, if he be kept to hay only, will eat at leaſt a load every two months *Ibid. p.* 5.

Fourteen pounds weight of hay is the conſtant allowance on the road to every fat beaſt that is drove to London; they that entertain cattle fling fourteen pounds of hay for each beaſt into the rack in the evening when they come into the inn, which is to ſerve alſo next morning for their breakfaſt; ſo that half a tod, or ſeven pounds of hay, is ſuppoſed ſufficient for a fat ox's bait at night, and the ſame in the morning. *Ibid p.* 9.

For the manner of feeding and fattening cattle with cabbages, carrots, turnips, turnip-cabbages, &c. *See the articles* CABBAGE, CARROTS, &c.

CAUTERY, a name given to a red hot iron, uſed by farriers to deſtroy fungous fleſh, &c.

CAUTING-IRON, an iron with which farriers ſear thoſe parts of a horſe that require burning.

CELLS, the ſmall diviſions in honey-combs, which geometers have obſerved, to be always regular hexagons.

CELLS, alſo denote the hollow places between the partitions in the pods, huſks, and other ſeed-veſſels of plants.

CENTAURY, the name of a weed abounding in arable lands, and generally called blue-bottle. *See* BLUE-BOTTLE.

CERES, a pagan deity, the inventor, or goddeſs of corn.

CERT-MONEY, a fine paid yearly by the reſidents of ſeveral manors to the lord thereof, and ſometimes to the hundred, for the certain keeping of the leet.

CHAFF, the huſks of corn that are ſeparated by thraſhing and winnowing. *See the articles* THRASHING *and* WINNOWING.

CHAFF alſo ſignifies the rind of corn: thus, barley that has a thick rind is ſaid to be thick chaffed.

CHAFF likewiſe implies ſtraw, &c. cut ſmall, and given to horſes and other cattle, mixed with corn. *See the article* CUTTING-BOX.

CHALK, the Engliſh name of the white dry marl, with a duſky ſurface, found in hard maſſes.

Chalk is a laſting manure for ſuch lands as it agrees with, which are particularly thoſe of a cold ſour nature, and ſtiff untractable clays. Pliny tells us, it was the cuſtom of the ancient Britons to chalk their lands, by which they received a great and laſting improvement.

Farmers are apt not to diſtinguiſh ſufficiently between the different kinds of chalk. The hard, dry, and firm, is much the fitteſt for burning into lime; but the fat unctuous chalk is by far the beſt to be uſed crude. This oily, viſcous ſort of chalk, is uſed in many places inſtead of marl, to which it is nearly allied, though of an inferior quality. It is even called marl in the iſle of Wight, where their chalk is of a remarkably fat ſoapy nature; and they ſometimes lay twenty-five waggon-loads of it upon one acre of ground. *Liſle's Huſbandry, vol.* I. *p.* 66.

A correſpondent of the editors of the Muſeum Ruſticum ſtrongly recommends chalk as a manure for clay-lands; but adds, it ſhould be laid on rough, in large clods whereby the land will gradually receive the greater benefit by it. The ſalts in the air will penetrate, and crumble the clods; and the land on which the chalk is laid, will ſoon be brought into a ſtate of fermentation, reduced and pulveriſed in a ſpecial manner, inſomuch, that afterwards, one ploughing will go as far towards bringing it into tilth as two before.

The quantity of chalk ſhould be proportioned to the ſtubbornneſs of the ſoil; from fifteen to thirty tumbril-loads on an acre.

The virtues of this manure are not exhauſted under, at leaſt, twenty years; nor are they much perceived till the third year; but for twelve or fourteen years the farmer will have reaſon to thank thoſe who adviſed him to the ſtep of chalking his clay-lands: and happy is he who can afford to do it, provided he has a long leaſe; for lands not worth five ſhillings an acre have, by this means been, in a year or two, worth twenty. *Muſeum Ruſticum, vol.* II. *p.* 305.

An old experienced farmer in the hundreds of Eſſex has, in the ſame work, give an excellent account of the benefits reſulting from chalk laid on clay-lands, where, he

juſtly obſerves, it inſinuates itſelf into the ſmall pores, and, raiſing a fermentation, expoſes the clay more to the operations of the froſts, rain, ſun, and air, by which means its too coherent particles are looſened, and it is reduced to a ſtate of pulverization.

"We all know, adds this intelligent huſbandman, that clay, when reduced, either by fermentation or attrition, into ſmall and minute particles, is an excellent ſoil for affording plenty of nouriſhment to almoſt every kind of vegetable: it is therefore natural to us, when poſſeſſed of a ſtiff clay, to go in ſearch of means for producing theſe deſirable effects.

"Chalk has been long allowed the palm in this reſpect: our anceſtors, the ancient Britons, uſed it with great ſucceſs; and the practice, as warranted by conſtant experience, has been handed down to the preſent age: is it not then a pity but a cuſtom ſo profitable ſhould not be made known to every part of his majeſty's dominions?

"The chalk we uſe in Eſſex is moſtly brought from Kent: it agrees well with our clays, and many fine fortunes have been made in this country by chalking farms: yet what may appear very ſtrange, but is not leſs true, this ſame chalk, when laid on the clayey lands in Kent near the pits, does by no means anſwer the farmer's expectation.

"It has been a common ſaying emong farmers, that chalk laſts only for a certain number of years, after which it leaves the land in a worſe ſtate than that in which it found it: but this is probably a miſtake, owing to prejudice, negligence, or ignorance.

"When land has been chalked, under a notion it cannot be hurt by cropping, they generally keep it in almoſt conſtant tillage, and it pays well for the ploughings; but then the ſoil being, by ſuch conſtant working, reduced to a pulverized ſtate, the chalk eſcapes through the now-enlarged pores of the clay, and forms a cruſt under the looſe ſtratum on the ſurface of the hard clay beneath, being waſhed down by the rains.

"The particles of clay being now deprived of their coatings of chalk, adhere one to the other, enlarge their ſurfaces, and become at length a coherent maſs of ſtiff ſoil, like what it was before the land was chalked at all, not worſe in quality, but nearly in the ſame ſtate. Probably the chief reaſon which induces farmers to think the land impoveriſhed by chalk is, becauſe they have, whilſt the manure acted with its full vigour, being for many years uſed to great crops, forgetting, or perhaps never knowing, what crops the land yielded before any chalk was laid on it.

"A great deal of care is requiſite in land after it is freſh chalked: if the large lumps are buried before they are ſtrongly impregnated with the influences of the atmoſphere, they will lie under ground undiſſolved, in a hard maſs, for a great number of years, without benefitting the land in the leaſt. For this reaſon, the farmer muſt not be in a hurry to bury his chalk: in fact, the longer it lies above ground the better, as it will then gradually be reduced into an impalpable powder, which, being mixed and incorporated with the clay, leſſens the coheſion of its parts, enlarges its pores, and diſpoſes it to yield that nouriſhment to vegetables, which, in its natural ſtate, it is too retentive of.

"Clay is, by nature, poſſeſſed of a large ſtock of the food, whatever it be, which plants moſt delight in; but it is a ſtubborn ſoil, and will not, till compelled to it by ſome extraneous cauſe, give forth any of its riches. If it is pulverized by the inſtruments of huſbandry which act by attrition, it becomes a proper bed for the reception of the roots of vegetables; but this pulverization is not to be effected without great expence of time and trouble: and it was the difficulty of this operation that induced our anceſtors to ſearch for ſome eaſier and ſhorter method for reducing the ſolid particles of clay; they effected it by means of fermentation, and this fermentation was raiſed, for the moſt part, by rotten horſe-dung.

"When this manure became ſcarce, and difficult to be procured, it was neceſſary to have recourſe to ſome other remedy to correct ſtiff ſoils. Chalk was found well adapted to the purpoſe: the uſe of it was after many years almoſt univerſally adopted, and experience has now, for many ages, juſtified the practice.

"It has been already obſerved, that chalk improves clay, not by adding to it any vegetative quality, but by mixing intimately with its ſubſtance, and leſſening the coheſion of its parts.

"Let us, by way of illuſtration, ſuppoſe any given quantity of clay mixed and incorporated with a proper proportion of chalk, it will be found that the clay will poſſeſs a degree of lightneſs, which nature has denied it. Let this mixed earth be ſpread on a floor expoſed to the weather in winter time; let it be frequently ſprinkled with water, and be ſtirred about ſeveral times a day for ſome months: on an examination, it will then be found, that the chalk has ſubſided, and the clay become more compact than it was, but not ſo compact as it was before any chalk was mixed with it.

"The ſubſided chalk will form a complete ſtratum under the bed of clay.

"I have been the more particular in this account, becauſe on the principle of ſubſidence I have founded a practice, which I have experienced to be profitable to myſelf, and therefore I think it not totally improper to be recommended to the notice of others.

"I had heard it long complained of, that the benefit reſulting from chalk ceaſed after a courſe of years. I always thought, and indeed found, that the chalk ſubſided: this made me form an opinion that the chalk, even after it had ſubſided, might, in part at leaſt, be retrieved; for the earth, which had been looſened to a certain depth, was, at the bottom of the looſe mould, a hard compact body, which the chalk could not penetrate: here therefore it muſt, of courſe, reſt in its ſubſidence, forming a thin coat on this hard body.

"About forty years ago I chalked the greater part of my farm in the manner preſcribed by the cuſtom of this country. For about fourteen years I enjoyed very good crops; but at the end of that time they began to fail a little. As neceſſity is the mother of invention, I came to a reſolution of trying an experiment on a field of twenty acres: accordingly, when the time came in which it was to receive a whole year's fallow for a crop of wheat, I cauſed the whole of it, ſoon after harveſt, to be ploughed twice in a place, one plough following another in the ſame furrow.

"By theſe means I turned up an entire new earth, on which I immediately laid in the proportion of about three loads of chalk an acre, ſuffering it to lie rough all the winter.

"In the ſpring I gave it a ſecond ploughing, and beſtowed

ſtowed on it three more ploughings before Chriſtmas, when I again left it rough for the winter.

" I muſt not, however, fail obſerving, that in all the ploughings after the firſt, the ſhare went only the ordinary depth.

" In the ſecond ſpring I raiſed as fine a mould as I could, by various operations, and ſowed the field with barley, of which I had, at harveſt, a crop to my entire ſatisfaction: my next crop was wheat, on which I ſprinkled ſome clover ſeed, which brought the land into the uſual courſe of huſbandry.

" The reaſon why my land begins to fail, in about fourteen years after chalking is, becauſe I allow more ploughings to each crop than any of my neighbours, and theſe frequent ſtirrings cauſe the chalk, as I imagine, to ſubſide ſooner.

" My method anſwered ſo well, that I managed all my chalked land in the ſame manner with good ſucceſs; and had, in conſequence, a ſucceſſion of good crops for ten years more.

" When the ten years were expired, I gave my land another trench-ploughing, which never failing to recover the chalk, I renew it at regular intervals, but lay no freſh chalk on it after the firſt trench-ploughing, being in all the reſt content with what is already in the land.

" This method has ſtood the teſt of many years experience, and I have not the leaſt reaſon to aſcribe it to any thing peculiar in the quality of my ſoil: why, therefore, ſhould it not ſucceed as well with others as it has done with me?

" Let me perſuade ſuch of your readers, as it may any ways ſuit, to make the experiment; it cannot be any great expence, and the reſult may turn out very greatly to their advantage.

" This doctrine of the ſubſidence of chalk is certainly founded on reaſon: the predominant natural ſoil will always precipitate that which is only adventitious, and in ſmaller quantity; for the ſame obſervation holds good when clay is laid on chalk.

" This ſubſidence may alſo be obſerved when clay is laid on ſand, or ſand on clay, as a manure; and might, perhaps, be extended to many other articles, ſo as to be deemed a general principle.

" Few know the benefits reſulting on ſome occaſions from deep ploughing: but in this, as well as in every other matter, diſcretion is to be the grand guide; and I would, by all means, adviſe the farmer to examine into the depth of his ſoil, by remarking what is thrown out of his ditches, or by the help of a borer. Let him judge by this, and he cannot well go aſtray.

" I muſt alſo give another caution to my honeſt brethren the farmers, which is, not to be in too great a hurry to crop a field after it has had a trench-ploughing; for the ſoil turned up from any conſiderable depth will be ſomewhat crude in its nature, till it is meliorated by the influences of the ſun and air.

" I have generally found that one whole year's fallow is ſufficient to effect this; but two winters and a ſummer I never knew to fail: it is chiefly froſt which contributes to pulverize the chalk, and ſweeten the ſoil; not but that it receives great benefit from the rain and ſunſhine, and particularly from ſnow, which is ſtrongly impregnated with nitrous particles; all I mean to inſinuate is, that one day's froſt, contributes more to ſweeten a ſtiff, rough, ſoil, than two day's ſunſhine, rain, or ſnow.

" Let me in this place hazard a conjecture, which may, however, prove a fact: the reaſon why froſt ſo much contributes to diſunite the particles of clay may be owing to its ſwelling the clods, and increaſing their ſurface: the cavities occaſioned by this ſwelling are filled with ice: when a thaw comes on, wherever the ice was, is a vacuum, and the particles of which the clay is compoſed, being ſeparated one from the other, crumbles and fall in pieces; when they are in this ſtate, and the land has been chalked, a ſingle ploughing, well-timed, will cover their ſurfaces with the chalk-powder, and prevent them from ſpeedily adhering one to the other.

" Your readers, who have been in countries where there are quarries of ſtone, muſt have obſerved, that, whilſt in the quarry, it works better than after it has been expoſed to the ſun; for it hardens conſiderably after it has been out of the quarry ſome time. It is the ſame with chalk, which is apt to be hardened by lying a ſummer in the ſun: for this reaſon, it is adviſable, that the chalk intended for manure ſhould be dug as ſoon as the winter ſets in, and laid preſently on the land. This method and time of chalking may occaſion ſome increaſe in the expence; but the farmer will be well paid for it in the end, and he will, by this management, ſooner reap the benefit of his labours.

" Let it not be imagined from any thing I have ſaid here, that I truſt ſolely to chalk for bringing me good crops; no, I always beſtow, once in a courſe of three or four years, a reaſonable coat of compoſt dung. I do not lay on the chalk with any intention that it ſhould enrich the clay: my deſire is, that it ſhould bring it to the nature of a loam, as the dung will then take effect, and enſure the farmer a large crop, provided he guards himſelf againſt the depredations of weeds, which are too apt to have their ſeeds mixed with the dung made of long ſtraw, and often grow faſter than the corn, with which the land ſhould be cropped. Dung, when prudently applied, is, like many other things, of great uſe; but it is dangerous in the hands of an ignorant land-holder. The expence of procuring it in quantity will ruin him, and his crops will go near to be choaked by the encroaching weeds." *Muſeum Ruſticum, vol.* III. *p.* 198.

This letter of the Eſſex-farmer, merits the particular attention of all thoſe who have clayey, or very ſtrong land, and are within a moderate diſtance of chalk, which is without doubt an excellent manure for ſuch land. And it has been found that chalk, particularly the fat ſoapy kind, is likewiſe a very valuable manure for loams, and other lands much lighter than clays; and though in the lighter ſoils the chalk is apt to ſubſide in a ſhorter time than it does upon clays, it is more eaſily recovered, and brought up again by ploughing a little deeper than ordinary, and at ſomewhat a ſmaller expence, than can be done when it ſubſides in a very ſtrong land. Chalk therefore is a manure that appears to be of almoſt as general uſe as marle; of which indeed it ſeems to be a ſpecies, and not improperly called marle in the Iſle of Wight.

" If chalk, ſays Mr. Liſle, be laid on clay, it will in time be loſt, and the ground again return to its clay; and if the clay be laid on chalk, in time the clay will be-

be loſt, and the ground return again to its chalky ſubſtance. Many people think the land, on which the other is laid for a manure, being predominant, converts the manure into its own ſoil; but I conceive, in both caſes, the chalk and clay is filtrated through the land on which it is laid, by time, and, being ſoluble by rains into ſmall corpuſcles, is waſhed through the land on which it is laid; for neither of theſe manures is able to unite, in its fineſt corpuſcles with the corpuſcles of the land on which it is laid, ſo as to form ſo ſtrict an union and texture with it as the land doth with itſelf, and is therefore liable to be borne downwards with rains, till no ſign of it be left.

"It is ſaid to be a common practice with many tenants in Hampſhire, three or four years before they leave their farms, to chalk their meadows; by which means they will for three or four years fling out a great crop of graſs, but that they will be much the worſe for it ever after. This ſeems to carry ſome reaſon with it; for the chalk ſo mellows and opens the pores of the meadow, that it enables the land to exhauſt its ſtrength in all parts: for chalk does not carry ſo much fatneſs as dung does to the land it is laid on; but it diſpoſes the land to bear ſuch crops by its ſweetneſs, and well diſpoſing of, and correcting an ill quality the land had before: but ſtill I do not ſee that this is any objection to the chalking of meadows, provided, whilſt, by virtue of the chalk, they are bearing ſuch burthens, you take care to refreſh them with dung.

"Though chalk laid on meadows enables them to give a great crop for three or four years, and will then impoveriſh them, yet I take it to hold quite contrary in paſture; for the graſs being thereby ſo much ſweetened and increaſed, keeps conſtantly ſo much the more ſtock, by which it is maintained always in the ſame vigour.

"It is probable, that chalk ſpread on ſandy or wood-ſeary ground, laid up for paſture, may waſh and ſink in, and fill up the interſtices, and thereby conſolidate and mend the texture of ſuch ground, and ſweeten it, as it is a great alkali; and though in time moſt of the chalk may be waſhed downwards, ſo that the ground may loſe its virtue, yet I do ſuppoſe the ſtrength of the ground may ſtill continue much better, by reaſon that ſuch manure having made the ſward of the graſs come thicker and ſweeter, the good paſturage on both accounts enlarges the quantity, and betters the quality of the dung the cattle leave on it, which, in return, maintains a better coat and ſurface to the ground: and as chalk fills up the vacuities of ſandy, or wood-ſeary ground, ſo, on the contrary, it inſinuates its particles into obſtinate clayey and ſtrong land, and divides it, by making in a manner, a ſciſſure, thereby hollowing and mellowing it; ſo that the two contrary extremes are cured by chalk.

Chalk laid on hop-clover and rye-graſs is a mighty ſweetener and improver of theſe graſſes, being laid upon it after harveſt, at the beginning of the winter, or whenſoever one can beſt tend it; the benefit will be ſoon conſpicious, eſpecially if the ground be of a ſour clay, and apt to run to coarſe graſs. *Liſle's Huſbandry, vol.* I. *p.* 66.

CHALKEY-*Lands*, are thoſe which are impregnated with chalk, and from their white colour, are in ſome counties, called white-lands.

The beſt produce of corn in chalky lands, is barley and wheat; oats will do well on them. Their natural produce for weeds is poppies, May-weed, &c. For graſs-ſeed, ſaintfoin, treſoil, and, if rich, clover. The beſt manure for theſe lands is rags, dung, folding of ſheep, &c. Theſe lands, if rain happens to fall on them juſt after ſowing, before the corn gets up, will cauſe the earth to bind ſo hard, that the corn cannot get through it; but may be much helped by a light harrowing.

In Hertfordſhire they manage theſe lands for corn in the ſame manner as they do their clay-lands. In Oxfordſhire they commonly manure theſe lands with half rotten dung, which, they ſay, prevents the binding of it, and ſome mix it with ſand, which cauſes it to work ſhort, eſpecially if any thing dry; they commonly ſow them there with wheat, miſlen, and barley; only after wheat they ſow peaſe or vetches: in ſowing of which they are obliged particularly to take care to have fine weather, becauſe of the land's binding; but if they have only two nights dry weather, they will do well enough. *Mortimer's Huſbandry, vol.* I. *p.* 68.

CHANFRIN, the fore-part of a horſe's head from one hand to the other.

CHANGE *of crops*, a very judicious part of huſbandry, conſiſting in a change of different ſpecies of grain on the ſame ſoil.

Experience ſoon taught men, that even the moſt fruitful ſoil cannot conſtantly yield the ſame grain; and this of courſe laid them under a neceſſity of ſeeking for means to remedy the defect. They found the plough the moſt ready, and perhaps the moſt effectual: and hence all the ancient writers ſo highly commend a thorough ploughing. At the ſame time the apparent loſs of the produce of the ground during the year of fallow, put them upon enquiring how this inconvenience might be prevented, conſiſtently with keeping the land in good heart. Repeated obſervations convinced the Romans, the moſt attentive of all nations to every thing relative to huſbandry, that, beſides the alternate reſting of the land, wheat may, as Pliny obſerves, be ſown after lupines, vetches, beans, or any other plant which has the quality of fertilizing and enriching the ſoil. This, ſays Mr. Liſle, deſerves to be well noticed, becauſe our farmers imagine they cannot make their rent, if they pay twelve ſhillings an acre, without ſowing their land every year; nor will they be perſuaded to lay it down to graſs.

A judicious change of crops, is without doubt of great importance in the common tillage huſbandry; as they enable the farmer to ſave the expence, and loſs of crop in the fallow year; and to conquer his great enemies the weeds, by attacking them at different ſeaſons in the year, and in different periods of their growth; eſpecially when the intermediate crops are hoed, as thoſe of beans and peaſe; for the repeated hoeings not only deſtroy the weeds, but alſo very much enrich the land. The benefit of changing the crops appears to ariſe from theſe, and the other circumſtances above-mentioned, rather than from the different food that the ſeveral crops are ſuppoſed to extract from the ſoil: becauſe the new huſbandry proves, that the ſame kind of crops may be continued, without change, from year to year in that huſbandry, ſo long as the hoeing culture is continued.

The

The moſt rational change of crops hitherto pointed out by any writer, is the following, planned by Camillo Tarello, and which he preſented to the ſenate of Venice in the year 1566.

" Let the ploughings hitherto given to corn-land divided into two portions (each of which being reſted every alternate year, receive four ploughings that year) be transferred to the half of one of thoſe portions, ſo that it be ploughed eight times, including the ſeed-ploughing; I mean, that every farm in tillage be divided into four equal parts, and that only one of theſe parts, taking them alternately, be ſowed with corn in any one year, after it has been ploughed eight times. Two of the other parts ſhould be laid down to graſs; and the fourth ſhould be fallowed a year, during which it ſhould receive the above-mentioned number of ploughings.

" He, therefore, who has now, for example, ten acres under corn, ſhould for the future ſow only five, and ſo in proportion for a larger or leſſer extent; and all the manure and labour formerly beſtowed upon his ten acres ſhould be appropriated to the five only; that is, he ſhould plough them eight times, unleſs the ſoil be extremely light.

" The huſbandman ſhould begin to plough in October or November, about ten months before he ſows, or ſooner if he can; but always in dry weather. He ſhould lay on his dung before the laſt ploughing; and ſhould not ſow more than two-thirds of the quantity of ſeed hitherto commonly uſed, and that ſeed ſhould be of the growth of the country.

" Whoever follows this method may always depend of reaping the following advantages:

" 1. This way of cultivating land leſſens the expence and labour; it being eaſier to plough one acre eight times, than to plough two acres four times each: becauſe, after the third time, an acre and a half, at leaſt, may be ploughed as ſoon as an acre could have been before; and if he begins his work in October or November, while the land is in good condition for ploughing, he may continue it the following year, at ſuch times as he will have little more urgent buſineſs, ſo as to have four ploughings done about the end of May. By this means the four ſummer ploughings will not require ſuch ſtrong ploughs as ſome people now uſe, to the great hurt of their cattle, and fatigue of the ploughman, becauſe the ground will be already well looſened.

" 2. Theſe repeated ploughings will deſtroy the ſeeds and roots of weeds, which rob the corn of its food, choak it, and hinder it from growing.

" 3. A field reſted, and then prepared in this manner, will yield more than double the produce of two equal ſpaces of land cultivated in the common manner, as I have often experienced. This is more than doubling one's income.

" 4. Over and above this great advantage, we likewiſe ſave two-thirds of the quantity of ſeed hitherto commonly uſed: for, by ſowing only a quarter inſtead of half of the land in tillage, there is an immediate ſaving of half of the ſeed formerly required; and by ſowing only two-thirds of the uſual quantity upon that quarter, we again ſave two twelfths, that is one ſixth of all the former ſeed: now half and one ſixth makes two thirds, to be deducted from the former uſual quantity.

" 5. We ſhall have a ſufficiency of ſtraw of every kind for all our uſes, eſpecially for litter and dung, ſo indiſpenſibly uſeful.

" 6. We ſhall have hay and fodder enough to keep many cattle; becauſe we may, and ſhould ſow one half of our ground with graſſes, which will thrive extremely well, while the land is thus reſted for two years, in order to be afterwards broken up, ploughed, and ſowed with corn in its turn: for I again adviſe ſowing only a quarter part of the whole farm with corn, and breaking up another quarter immediately after ſeed-time, before winter; and, on the contrary, neither of the other quarters ſhould be ploughed during two years. But as the earth is deſtined continually to yield productions of one kind or another, even while it reſts, we ſhall do well in following the path pointed out by nature, by helping it to produce clover, and other plants fit for fodder, which are of ſingular ſervice to us, not only on account of the hay we reap from them, but alſo becauſe their roots greatly improve the ſoil. In the country about Breſcia, plentiful crops of the fineſt flax are reaped from fields where a quantity of clover has been lately mowed; and lands are let there for a great price, not only becauſe the ſoil is rich, and can be watered, but alſo becauſe it has juſt been under clover. If ſuch value is ſet upon land intended only for flax or millet, how much more would good wheat-land juſtly deſerve?

" 7. A ſeventh advantage will be, that land reſted regularly for two years (I ſay, with Virgil, that it reſts when it is not ploughed) being well conditioned, afterwards well prepared, ploughed, enriched by the roots of the graſſes, and kept clear of weeds, will yield crops more than twice as great as any we now reap; a truth which I have practically experienced, which the moſt ſenſible and moſt judicious huſbandmen that ever lived have long told us, and of which a trial will ſoon convince the moſt incredulous.

" 8. One of the moſt conſiderable advantages attending this method, is the eaſe with which a great number of cattle may be reared, by means of the increaſed quantity of hay and green fodder. We ſhall conſequently have more horſes, more oxen, more cows, more ſheep, and more poultry. Every one knows of what infinite ſervice all theſe are, to feed us, to cloath us, and to help us in our work. He, therefore, who has hitherto been obliged to have two yoke of oxen will, in this method, want only one, and may, inſtead of the other, feed two or three cows: for as the labour is hereby leſſened, and the quantity of good fodder increaſed, two oxen will be ſufficient to plough the land, eſpecially as the ſoil will, by theſe means, be brought daily into better and better tilth.

" 9. From hence naturally ariſes a ninth advantage, which is, the quantity of manure produced by the increaſe of cattle and of fodder; an advantage which no good huſbandman will neglect to purchaſe, if the means of doing it are but pointed out to him.

" The tenth and laſt of the advantages which I ſhall here enumerate, as reſulting from this new method of culture, is, that poor and barren lands are hereby rendered, by degrees, good and fertile: for ſuch is the conſtitution of the earth, that ploughing and manuring alter its very nature, and improve it more and more, as experience repeatedly demonſtrates. Valerius Maximus inſtances the ſtriking example of Maſiniſſa king of Numidia, who made agriculture flouriſh ſo much, that he left his country,

try, which he found barren and desolate, stored with riches and every good thing. It is in our power to do the same. On the contrary, it is not less true, that even though the earth be rich and good, it will yield but little fruit, if it be not well cultivated; resembling therein the capacity of the human mind, which according to Cicero's fine comparison, is enlarged only by study and exercise. Industrious labour will not only procure us the necessaries, nay the superfluities of life, but will even change a barren country into a kind of garden. *Ricordo d'Agricultura di Tarello.*

M. Duhamel, after observing that the French farmers, in general, change their crops, not on any principle dictated by reason, but merely because it was the custom of their forefathers, or they themselves perhaps have occasion for some particular growth, draws a parallel between the practice of dividing arable land into three parts, or into two, in order to their being alternately sown, and rested, "I have, says he, some acquaintaince with the methods of practice in Guienne, and in part of Normandy; and am obliged to M. le Baron de Sournia, governor of Querebus, for enabling me to give an account of the methods used in the neighbourhood of Perpignan, where his estate lies.

"In this hot climate they sow their lands in September, and begin to cut wheat about the twelfth of June; so that their harvest is generally finished by Midsummer.

"They divide their lands into two portions only; so that in one year they sow wheat, and the other the land should be suffered to rest. But, on such part of their lands as are most valued, they have several crops during the year of rest: this impoverishes their lands, and they are obliged to sow their wheat too late, which lessens the crop. We shall mention an instance given by M. Sournia.

"In land they can water, they sow clover immediately after wheat-harvest; scattering the clover-seed among the stubble. The land is then immediately watered, and is afterwards several times repeated during the summer: in the winter they feed it with sheep and lambs. Such as have no flocks sell their pasture to the upland farmers, who have flocks but no winter fodder, their land being covered with snow: this pasture therefore fetches a very high price.

"In spring, when the green fodder has been eaten down by cattle, they water the land, and by that means the clover sprouts apace; when it is in blossom they mow it, make it into hay, and lay it up with the rest.

"Immediately after this crop, they dung the land; and such as are not afraid of exhausting it, plough it, and sow either kidney-beans, or small millet: but as they cannot plough for wheat till these crops are off the ground, there is not time sufficient for giving the land proper tillage; the sowing is retarded, and the rich particles of the dung are partly consumed by these crops, while the manure might be more usefully employed on lands they cannot water. M. de Sournia is, by repeated experience, convinced, that, to have good crops of wheat they must be contented with the crop of clover, and only sow kidney-beans, millet, &c. in small quantities for the use of the family.

"In Guienne, as well as in Anjoumois, they raise a crop of maize, which is a great impoverisher of the ground, during the year of fallow.

"The good husbandmen also think, that in the rich lands, which they cannot water, it is the best, in a farm of three hundred and fifty acres of wheat, to be careful to give proper tillage to the one hundred and fifty acres that should be in fallow, to make them proper for the reception of wheat. This is also the practice of some districts of Normandy, where the climate being colder, and the soil more backward, they have scarcely an opportunity of having any crop but wheat. However, when the land has been well dunged and tilled for maize, as they bestow three ploughings on that plant, there is commonly the next year a very good crop of wheat.

"It is evident, that by dividing a farm, that has three hundred acres in tillage, into two equal portions, which are sown alternately every other year, the tenant, during a nine years lease, will reap one thousand three hundred and fifty acres of wheat: whereas, if the land be divided into three portions, it will amount to nine hundred acres only. But in the latter case, the former has nine hundred acres of spring corn, which being estimated at half the value of the wheat, make it just equal to one thousand three hundred and fifty acres of wheat. It follows therefore, that in grazing countries, where they plough with oxen, and use but few oats, it is most advantageous to divide the land into two portions; but that this is not to be done in farms that are tilled with horses, because the necessary purchase of oats would amount to the value of the four hundred and fifty acres of wheat extraordinary.

"The farmers about Bayeaux, in Lower Normandy, have two methods of changing their crops.

"According to one of those methods, 1. They sow buck-wheat towards the end of June. 2. When the roots and stems of this plant are dead and withered, which is about All saints day, they plough, and immediately sow wheat: the wheat is therefore sown on one single furrow. These lands have indeed been ploughed for buck-wheat, and even thoroughly dunged; and plenty of manure can supply the place of good tillage, and the latter can supply the place of the former. 3. After reaping the wheat, they plough in the stubble as soon as possible; and, after giving the land a second ploughing in February or March, they sow it with oats; or a third ploughing is bestowed upon it, in order to crop it with barley: 4. They plough in the barley stubble in winter, and after giving the land one spring ploughing, sow either peas or tares: 5. Immediately after this crop is off, they turn down the land, that it may receive two ploughings before October, when it is sowed with wheat. 6. The following year they sow oats mixed with a little clover-seed; after which it is laid down in pasture for three or four years. It would be needless to mention that the farmer varies the order of his succeffive crops, according to the nature of the soils, and his own occasions; but by this method, six crops are reaped in six years; two of wheat, two of oats, one of buck-wheat, and one of peas or turnips; and the field is then left in clover to be fed for four years.

"According to the other method, they sow no buck-wheat on the land they break up; it is left in fallow from February or March, when it is turned up, till October; and during this interval they manure it, and give it several ploughings to prepare it for wheat. In this case the crop is generally more plentiful, than when buck-

buck-wheat has been ſown. In other reſpects, the change of crops is the ſame as was mentioned before," *Culture des Terres, tom.* VI. *p.* 34.

The changing of crops, upon rational principles, though of infinite conſequence in agriculture, ſeems to have been neglected, and even forgotten, after the time of the ancient Romans, till Camillo Tarello pointed out its great importance, as we have already obſerved in this article: nor do we, ſince him, find much attention paid to this eſſential part of huſbandry, till very lately, when the culture of turnips probably gave the uſeful hint; the farmer obſerving, that his land, inſtead of being impoveriſhed by that root, was enriched, and prepared to yield a better crop of barley in the ſpring. This might naturally ſuggeſt to him, that other ſucculent plants, which cover the earth with their leaves, might have the ſame effect. The ſucceſs has anſwered his utmoſt expectation: for it is now found that a fallow does not become neceſſary in ſeveral years; the ground being kept in heart by a variety of crops when rightly timed, and properly managed. The Society for the Improvement of Agriculture in Scotland, from whom we ſhall borrow the following judicious inſtructions, have the honour of ſetting this diſcovery in its proper light.

They obſerve, "That ſome crops, as peas, beans, clover, and all plants of the pulſe kind, are enrichers and cleaners of the earth; while wheat, oats, barley, and the whole tribe of vegetables, whoſe roots are fibrous, and ſpread far, impoveriſh and rob the ground. The latter are alſo foulers of it, by giving way to weeds and graſs, which, being the natural product of every ſoil, are more readily nouriſhed by it, than any plant which it does not ſpontaneouſly produce; and if the earth be fed with any ſort of manure, it will while the weeds and graſs remain undeſtroyed, like a tender mother, cheriſh and nouriſh them in proportion to the food ſhe receives.

"Wheat and oats are great robbers of ſoils. Wheat remains a long time in the ground, during which the land untils itſelf, coaleſces, and becomes of the nature of uncultivated earth; while the weeds, meeting with no oppoſition, ripen, and ſhed their ſeeds. Oats do not continue ſo long: but they bind the ſoil by their ſtrong roots, and give many weeds time to ripen. Barley, as it ſtands only a few months, and ſeveral ploughings are given for it, binds the earth leſs than either wheat or oats. Peas, beans, tares, &c. are ſuppoſed to draw much of their nouriſhment from the atmoſphere, and that in proportion to the ſucculency of their ſtems and leaves, whereby it is probable their roots diſcharge a moiſture under ground; and their leaves, covering the ſurface of the earth, return the moiſture and dews deſcending through them, which mellow and rot them into a kind of manure." *Maxwell's Collection, p.* 219.

From the above obſervations, the farmer will be able to vary his crops in ſuch a manner as always to keep his ground in heart, and free from weeds; particulars which cannot fail of producing very great advantages.

CHANNEL, of a horſe, is the hollow between the two bars of the under jaw bone, in which the tongue is lodged.

CHARCOAL, a ſort of fuel, conſiſting of wood charred, or half burnt.

The duſt of charcoal has been found, by repeated experience, to be of great benefit to land, eſpecially to ſuch as is ſtiff and ſour. It is to be uſed in the ſame manner as ſoot and wood-aſhes. *See the articles* ASHES *and* SOOT.

CHARLOCK, called alſo *Chadlock*, *Catlock*, *Corlock*, and *White-Rape*, is a weed too generally known to need a particular deſcription, the figure we have given of it on Plate V. Fig 32. will be abundantly ſufficient. Almoſt the whole plant is covered with bent pellucid hairs.

There are two ſorts of charlock, one bearing white, and the other yellow flowers, but they ſeem to be only a varieties of the ſame plant. The young plants of charlock ſo nearly reſemble thoſe of turnips, that they are not eaſily diſtinguiſhed but by the taſte; the charlock being hot and bitter, and the turnip mild. Farmers ſhould therefore be very careful in weeding their turnips, leſt they miſtake them for charlock.

Mr. Liſle obſerves, that cold wet lands are always more ſubject to charlock than white or chalky lands: becauſe the charlock-ſeed being very oily, reſiſts putrefaction, and is not eaſily opened or penetrated by moiſture, whereas white and light earth is ſoon dry after rain, and the water does not continue long enough on it to make ſuch ſeed germinate ſo effectually as in the other. By an experiment which he made in ſowing charlock-ſeed and turnip ſeed at the ſame time, he found that the turnips will appear in three days, but the charlock in not leſs than ten. A hint that may prove very uſeful to the huſbandman. *Liſle's Huſbandry, vol.* II. *pag.* 297.

Mr. Mortimer after remarking that both the white and yellow charlock are very prejudicial to corn, and that ſome lands are very ſubject to it, eſpecially if manured with cow-dung alone, which he thinks increaſes it more than any other manure, unleſs it be mixed with horſe-dung, or ſome other hot manure, mentions his being told of a perſon who had vaſt quantities of this weed in a field of barley, mowed the whole when the charlock was in flower, and ready to ſeed, which is commonly about the middle of May, as low as he could, without taking off more than juſt the tops of the blades of the barley; and that this gave the corn an opportunity to get above it, in ſuch a manner, that he had four quarters of barley on an acre. He adds, that where a fallow is full of charlock, it will be right to turn in ſheep, which will eat it very readily. *Mortimer's Huſbandry vol.* I. *p.* 311.

Charlock is a more agreeable food to ſheep than turnips: for I have ſeen where ſheep have broke into a field of turnips, they have eat down the charlock almoſt to the ground, and have not touched any of the turnips.

CHASE, a word uſed in ſome counties to ſignify a row or rank. Thus in the planting of quickſets, a ſingle chaſe implies a ſingle row; a double chaſe, means another row planted below the firſt, not immediately underneath the upper plants, but under the middle of the intermediate ſpaces. *Liſle's Huſbandry, vol.* II. *pag* 405.

CHATS, the keys of trees, ſuch as the aſh, ſycomore, &c.

CHEDDER-CHEESE, a name given to a very large kind of cheeſe made at Chedder, a village near Mendip-hills in Somerſetſhire, famous for its paſtures. It is common in this place for three or four daries to join their milk to make one great cheeſe, which generally weighs from one hundred and fifty, to two hundred weight;

and which they often ſell at ſix-pence per pound on the ſpot.

CHEESE, a well-known ſpecies of food, prepared from curdled milk, preſſed from the whey, and afterwards dried for uſe. *See the article* DAIRY.

CHEESE-LIP, a bag in which the dairy-women prepare and keep their runnet for making cheeſe. *See* RUNNET.

CHEESE-PRESS, a preſs uſed in dairies for ſqeezing the whey out of the cheeſe. We have given a drawing of the common cheeſe-preſs, on Plate VI. Fig. 1. where A B is the preſs, C E, and F G are levers moveable about the points D, E, F, G, by applying the hand at C; S is the ſtone or weight; and H the cheeſe to be preſſed.

CHEESE-RENNET. *See* YELLOW LADIES BEDSTAW.

CHERRY-WINE, a very cooling and pleaſant drink, made from the juice of cherries, properly fermented. The chief care neceſſary in making it, is to let the cherries hang upon the trees till they are thoroughly ripe, by which means their juice, which they yield in great abundance, will be the better perfected and enriched by the ſun; to gather them in dry weather; preſs out their juice, and add a quantity of ſugar proportioned to the ſtrength you deſire in the wine; for the more ſugar there is added to the natural juice of the cherries, the ſtronger and richer the wine will prove, when of a proper age. When this is done, the whole muſt be regularly fermented, according to the method laid down under the article fermentation. *See* FERMENTANION.

CHEST, the breaſt, or that part of an animal's body which contains the heart, lungs, &c.

CHEST-FOUNDER, a diſtemper incident to horſes, and occaſioned by an improper treatment of an inflammation between the ribs. For if the inflammation be not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines, that a free circulation is obtained, ſuch a ſtiffneſs and inactivity will remain on thoſe parts as will not eaſily be removed; and this ſtiffneſs is generally called cheſt-founder.

The ſigns of this inflammation, are a ſtiffneſs of the body, ſhoulders, and fore-legs; attended ſometimes with a ſhort dry cough, &c. a ſhrinking when handled in thoſe parts.

Bleeding, ſoft pectorals, attenuants, and gentle purges are the internal remedies: and externally the parts affected may be bathed with equal parts of ſpirit of ſal ammoniac, and ointment of marſhmallows, or oil of chamomile.

Theſe outward inflammations frequently fall into the inſide of the fore-leg, and ſometimes near the ſhoulder; forming abſceſſes there, which terminate the diſorder. *Bartlet's Farriery, pag.* 57.

CHESNUT-TREE, the name of a tree, which well deſerves the planter's care, affording excellent timber, and a very agreeable ſhade. It will grow to a very great ſize, and ſpread its branches finely on every ſide where it has room.

The leaves are large, and of a lucid green, and continue late in the autumn; nor are they ſo liable to be eaten by inſects, as thoſe of the oak; nor is there any better food for deer, and many other animals, than the fruit of this tree.

Cheſnut-trees are propagated by planting the nuts in February, in beds of freſh undunged earth. The beſt nuts for ſowing, are ſuch as are brought from Portugal and Spain, provided they are not kiln dried, which is generally the caſe of thoſe brought from abroad, to prevent their ſprouting during their paſſage: if they cannot, therefore, be procured freſh from the tree, it will be much better to uſe thoſe of the growth of England, which are full as good to ſow for timber or beauty, as any of the foreign nuts, though their fruit is much ſmaller. The nuts ſhould be preſerved in ſand, until the ſeaſon for ſowing, otherwiſe the mice and other vermin will ſoon deſtroy them. Before you ſet the nuts it will be proper to put them into water, to try their goodneſs, which is known by their weight; ſuch of them as ſwim upon the ſurface of the water ſhould be rejected as good for nothing; but ſuch as ſink to the bottom, you may be ſure are good.

In ſetting theſe nuts, the beſt way is to make a drill with a hoe, about four inches deep, in which you ſhould place the nuts at about four inches diſtance, with their eye uppermoſt; then draw the earth over them with a rake, and make a ſecond drill at about a foot diſtance from the former, proceeding as before, allowing three or four rows in a bed, with an alley between, three feet broad, in order to clear the beds, &c. When you have finiſhed your plantation, you muſt be careful that it is not deſtroyed by mice, or other vermin: which is very often the caſe, if they are not prevented by traps, or other means.

In April theſe nuts will appear above ground; you muſt, therefore, obſerve to keep them clear from weeds, eſpecially while young: in theſe beds they may remain for two years, when you ſhould remove them into a nurſery at a wider diſtance. The beſt ſeaſon for tranſplanting theſe trees, is either in October, or the latter end of February; but October ſhould be preferred. The diſtance theſe trees ſhould have in the nurſery, is three feet row from row, and one foot in the rows. If theſe trees have a downright tap-root, it ſhould be cut off, eſpecially if they are intended to be removed again; this will occaſion their putting out lateral roots, and render them leſs ſubject to miſcarry when they are removed for good.

The time generally allowed them in the nurſery is three or four years, according to their growth; but the younger they are tranſplanted, the better they will ſucceed. Young trees of this ſort are very apt to have crooked ſtems: but when they are tranſplanted out, and have room to grow, they will, as they increaſe in bulk, grow more upright, and their ſtems will become ſtrait.

After they have remained three or four years in the nurſery, they will be fit for tranſplanting where they are to remain; for the younger they are planted out the better they will ſucceed. But if they are propagated for timber, it is by much the better method to ſow them in furrows, and let them remain unmoved: for theſe trees are apt to have a downright tap-root, which, being hurt by tranſplanting, often checks their upright growth, and cauſes them to ſhoot out into lateral branches.

If you deſign a large plantation of theſe trees for timber, after having two or three times ploughed the ground, the better to deſtroy the roots of weeds, you ſhould make your furrows about ſix feet diſtance from one

one another; in which you ſhould lay the nuts about ten inches apart, covering them with earth about two inches deep; and when they come up, you muſt carefully clear them from weeds. The diſtance allowed between each row is for the uſe of the horſe-hoeing plough, which will diſpatch a great deal of this work in a ſhort time; but it ſhould be performed with great care, ſo as not to injure the young plants; therefore the middle of the ſpaces only ſhould be cleaned with this inſtrument, and a hand-hoe uſed to clean between the plants in the rows, and alſo on each ſide, where it will be unſafe for the plough to be drawn; and in hand-hoeing great care muſt be taken not to cut the tender rind of the plant. But for the two firſt years after ſowing, it will be adviſable to dig the ground each winter; becauſe the plants will be too ſmall to admit the hoeing-plough, and in ſummer to hand-hoe the ground.

When theſe have remained three or four years, you will, if the nuts have ſucceeded well, have many of theſe trees to remove; which ſhould be done at the ſeaſons before directed, leaving the trees at about three feet diſtance in the rows; at which diſtance they may remain for three or four years more, when you ſhould remove every other tree, to make room for the remaining, which will reduce the whole plantation to ſix feet ſquare; which will be ſufficient for them, till they are large enough for poles, when you may fell every other tree, within a foot of the ground, in order to make ſtools for poles, which, in eight or ten years time, will be ſtrong enough for making hoops, hop-poles, &c. for which purpoſes they are preferable to moſt other trees; ſo that every tenth year here will be a freſh crop, which will pay the rent of the land, and all other incidental charges, and, at the ſame time, a full crop of growing timber left upon the ground.

Cheſnut-trees were formerly much cultivated in England, and doubtleſs produced good profit to the owners; for the wood of this tree is equal in value to the beſt oak, and, for many purpoſes, far better; particularly for making veſſels to hold all kinds of liquor, it having the property, when once thoroughly ſeaſoned, of maintaining its bulk conſtantly; and is not, like other timber, apt to ſhrink or ſwell; and hence all the large caſks, tuns, &c. for wines in Italy, are made of this timber, as being preferred by the inhabitants to any other timber whatſoever. It is alſo very valuable for pipes to convey water under ground, as enduring longer than the elm, or any other wood. In Italy it is planted for coppice-wood, and is much cultivated in ſtools, to make ſtakes for ſupporting their vines, as it will endure ſeven years, which is near double the time any other ſtakes will do. *Miller's Gard. Dict.*

CHEWING-BALLS, the name of a medicine adapted to reſtore a loſt appetite, an infirmity which horſes are often ſubject to, proceeding from a ſalt humour, and a bitter phlegm, which obſtructs the paſſage of the throat, and makes them loath their food.

Theſe balls are made in the following manner: Take a pound of aſſa-fœtida, as much liver of antimony; half a pound of the wood of bay-tree; an equal quantity of juniper-wood; and two ounces of pellitory of Spain: pound all theſe ingredients apart into a groſs powder, in order to which the woods muſt be previouſly well dried. Then put them all together into a mortar, and incorporate them with a ſufficient quantity of good verjuice, well clarified, pouring it in by degrees, till the whole is reduced to an uniform maſs. Make the whole into balls of an ounce and a half each, and dry them in the ſun. Wrap one of theſe balls in a linen-cloth, and faſtening a thread thereto, make the horſe chew it for two hours in the morning, and he will eat as ſoon as you take off the bridle; do the ſame at night, and continue this method till the horſe recovers his appetite. When one ball is conſumed, put in another.

Theſe balls may be uſed on the road, as you travel, being faſtened to the bit of the bridle.

CHICKLING *vetch*, called by gardeners, the common everlaſting pea, and by C. Bauhine, *lathyrus latifoliis*, a perennial plant, growing naturally in many parts of England.

A correſpondent of the editors of the Muſeum Ruſticum recommends this plant as well deſerving cultivation for the food of cattle, as the root, which will grow in almoſt every ſoil, yields every year a great burden of excellent provender.

"I ſowed, ſays this gentleman, three years ago, a rood of land, light, and but poor in quality, with this ſeed: the work was done early in the ſpring, the land being prepared as for barley.

"I ſowed it not in the broad-caſt way, as I ſhould have found it much more difficult to keep down the weeds; but I cauſed a ſlight furrow to be drawn the length of the land, with a light plough; and when the ſeed was thinly ſprained, or rather dropped into this, another was drawn at a foot diſtance, in which the ſeed was dropped in the ſame manner.

"An interval, or fallow ſpace, was then left at leaſt two feet wide; and then two more rows of the vetches, till the whole land was ſown. I muſt obſerve, that I covered the ſeed by means of a light harrow with wooden tines, drawn backward and forward acroſs the land.

"When the plants came up, I had them well hoed to clear the ground of weeds; and when they grew a little ſtrong, they were ſet out with the hoe to about a foot diſtance in the rows, that they might have room to ſpread and branch.

"The firſt year they yielded no great quantity of fodder, but they have ſince made me ample amends.

"The ſecond ſpring they came up very ſtrong and vigorous, branching out much; and when I turned a couple of horſes in to feed, they were very fond of it, eating it very greedily, though they were taken out of a good natural upland paſture.

"The laſt ſummer the land was almoſt entirely covered, and it yielded a great deal of ſeed indeed; for experiment ſake, I cauſed a few roods to be mowed juſt before it flowered, and it made good hay, ſweet, and without being ſticky.

"I therefore think, from my little experience in the matter, I have ſome foundation for recommending this plant to the notice of the public. I could wiſh, indeed, I had been more accurate in my experiment; but what is paſt cannot be recalled: and ſome other perſon may, perhaps, hereafter, give the public more uſeful information on this head."

CHICKWEED, called by botaniſts *cucubalus*, flowers early in the ſpring, and, if it be ſuffered to grow, ſeveral times in the courſe of the year. The way to deſtroy

it is therefore to pluck it up from time to time, before it can ſhed its ſeed.

The berry-bearing ſort, which grows with ſmooth, erect ſtalks, globular empalements, and ſtamina longer than the petals, is the wild lychnis, or white behen of the ſhops. This is a very rambling weed, natural to moſt parts of England, and is frequently called ſpatling poppy. Its roots are perennial, and ſtrike ſo deep into the earth, that they are not eaſily deſtroyed by the plough; for which reaſon, bunches of this plant are too common among corn, in land which has not been perfectly well tilled. Summer fallows, and carefully harrowing out every part of the roots, which ſhould then be burnt, will here prove the beſt and moſt effectual remedy.

CHICKWEED is alſo the name of an annual weed, called by botaniſts *alſine*. This weed, though it periſhes every year, will ſoon become very troubleſome, if ſuffered to ſtand till it ſheds its ſeeds, which Mr. Liſle thinks it will do ſeveral times in the year; for he obſerved on the 23d of October, a great deal of this weed, the branches of which carried many buds of bloſſoms, many flowers full blown, and many pods with white ſeeds almoſt ripe: ſo that its increaſe may be the leſs guarded againſt by any ſort of huſbandry in the common way. The repeated horſe-hoeings in the new huſbandry muſt here be of ſingular advantage; and, at all events, particular care ſhould be taken, to prevent the ſeeding of this plant upon dung-hills, where it is too often ſuffered to grow unnoticed and undiſturbed: for its ſeeds ſcattered there, and intermixed with the dung, will ſoon give birth to a multitude of weeds in the land upon which it is ſpread; unleſs it be kept, as indeed all dung uſed for manure ought to be, till it is thoroughly rotted, and the ſeeds have loſt their vegetative power.

To CHISSUM, to put forth roots, to grow.

To CHITT, to ſprout out, to grow.

CHITTED, ſprouted, ſhot out, grown.

CHIZZLE, bran, the huſky parts of ground-wheat.

CHOCKY, the ſame with chalky, reſembling chalk, mixed with chalk, or of the nature of chalk.

CHOLIC. *See* GRIPES.

CHURN, the name of the veſſel in which the cream is coagulated by agitation.

There are two ſorts of churns, one called the common or Dutch churn, and the other the barrel churn.

The common churn is repreſented on Plate VI. Fig. 2, 3. where Fig. 2. is the arbor or ſtaff; and Fig. 3. the body of the churn. The lower end of the ſtaff is placed in the body of the churn, and being raiſed with a pretty quick motion by the hand on the upper part of the ſtaff, the cream in the body is agitated, and by that means coagulated into butter.

Fig. 4, 5, 6, 7. repreſents the ſeveral parts of the barrel-churn.

Fig. 4. is the arbor of the barrel-churn. Fig. 5. its bung, or cover. Fig. 6. the body of the churn. And Fig 7. the ſtand on which it is placed. The arbor cannot be taken out of the body of the barrel-churn, without the help of the cooper; but is here repreſented by itſelf, to ſhew the manner in which it is made. In Fig. 6. the churn is repreſented with the arbor on it, but not placed on its ſtand, in order to ſhew the latter. When the utenſil is to be uſed, the churn is placed upon its ſtand; the cream poured into it through the bung-hole, and the hole cloſed with its bung. The arbor is then turned round pretty faſt, by which the four leaves of the arbor agitate the cream, and coagulate it into butter. *See the article* DAIRY.

CIBOULES, a ſort of ſmall onions propagated only by ſeeds, which, if ſown in March, will be ripe in Auguſt; and theſe are reckoned the beſt for keeping; but they may be ſown in almoſt every ſeaſon. They differ from the onions, of which they are probably a degeneracy, in that they do not form bulbs at their roots, but ſhoot out ſeveral upright blades, and thoſe which produce the greateſt number of theſe, are reckoned the beſt.

Their culture is the ſame with that of onions, like which they muſt be thinned, and well weeded. They will increaſe greatly, even in very dry ſummers, if they have been tranſplanted into beds of good earth, and thoſe beds are kept well watered. The reddeſt, hardeſt, and mildeſt are the moſt eſteemed.

CIDER, *or* CYDER. *See the article* CYDER.

CLASPERS, the threads or tendrils of creeping plants.

CLAVER, a word uſed in ſome counties of England for clover. *See* CLOVER.

CLAW, the foot of a beaſt or bird, armed with ſharp nails.

CLAY, an unctuous and tenacious earth, juſtly accounted the ſtiffeſt of all ſoils.

Clays are of different ſorts, and of as different colours. One kind of them is ſo obſtinate, that ſcarce any thing will ſubdue it; and another ſo hungry, as not to be ſatiated without uncommon pains, becauſe it abſorbs whatever is applied, and turns it to as bad a clay as itſelf. Some clays are fatter than others, ſome more ſlippery; all of them tenacious of water on the ſurface, where it ſtagnates, and chills the plants, without penetrating the ſoil; and in dry ſeaſons they harden with the ſun and wind, are very barren, and extremely untractable. The cloſeneſs of clay hinders plants from extending their roots to ſearch for their neceſſary food, and prevents the entrance of water, which would help to convey it to them.

The more unctuous and fat clay frequently lies upon the other, and has often a bed of chalk beneath it: but neither is this worth any thing till looſened, and fitted to admit the influence of the ſun, air, froſt, &c. The blue, white, and red clay, if ſtrong, are all unkind: the ſtony and looſer ſort is ſometimes tolerable; and the light brick-earth does very well with moſt fruit-trees.

Clay, in general, of whatever kind it be, is, of all earths, the very worſt for vegetation: yet even this, as well as any other untoward ſoil, may, with induſtry, and proper correctives, be made to produce roots and plants which require the lighteſt and holloweſt mould.

Among all the manures for clay, ſea-ſand claims the preference, founded upon experience, as beſt ſuited to break its too great coheſion. Dr. Cox has given us a very accurate account of the ſea-ſand uſed by the farmers of Cornwall, by which the lands are greatly benefitted, and their crops largely increaſed. Doubtleſs the huſbandmen of other parts of the kingdom, whoſe lands lie within a moderate diſtance of the ſea, might find the ſame

ſame advantage from uſing the ſame manure, which many of them are too apt to overlook.

"The ſea-ſand made uſe of in the agriculture of Cornwall, ſays that ingenious gentleman, lies commonly at or near the ſhore. To diſtinguiſh it from what is uſeleſs, it is proper to obſerve, that this ſand is formed by the grating of ſtones, ſhells, &c. rolled, and tumbled over by the waſh of the ſea. If the matter be ſhelſy, as it is called, that is, the particles formed by the rubbing of ſtones only, it is of ſmall value: but if it be notably ſhelly, it is the thing deſired. Of this ſhelſy ſand there are three colours. About Plymouth, and the ſouthern coaſt, it is bluiſh, or grey, like aſhes, which I conceive to be from the breaking of muſcles chiefly, and oyſter-ſhells mixed with it. Weſtward, near the land's-end, the ſand is very white; and in Scilly, glittering. This I think comes from the mouldering of moor-ſtones, or a kind of free-ſtone, mingled with the white ſheils of the ſcallop-fiſh. On the north-ſea about Padſtow, and eaſtward of Lundy, the ſand is rich, of a reddiſh-brown colour tinged with yellow, and conſiſts chiefly of the broken ſhells of cockles; which I gueſs to be of that colour there, from the waſh of the Severn, which falls very dirty into the Severn-ſea.

"Beſides theſe differences in the colour of the ſand, there is alſo another in the bigneſs of the grain. The ſmall is reckoned beſt for the tenant who takes to tillage only for four years; becauſe it works ſooneſt, and yields the moſt ſpeedy return. The larger grain is thought to be more profitable for the landlord, becauſe it abides longer in the ground, and makes the paſture afterwards the richer.

"In Falmouth-haven, near St. Mawe's-Caſtle, there is a ſort of ſand, or rather coralline, that lies about a foot under the ooze; which ooze being removed, and the bed opened, this ſand is taken up by a dredge, and is uſed about Truroe, Probus, &c.

"Weſt of the mount, in Portcuthnoe-cove, is a large ſhelly ſand. In White-ſand-bay, and about St. Ives, it is very white and ſmall.

"About Minver, Perinſand, and Lelant, the ſands are frequently blown up by the wind, and cover abundance of good land. Some houſes and even churches have been buried in it; nor has any method hitherto diſcovered been able to prevent its devaſtation.

"Of all theſe ſands, the beſt are accounted, as to colour, firſt the reddiſh, next the blue, then the white. As to kinds, the moſt ſhelly, and the coralline are the beſt, eſpecially if it be taken up from under the ſalt-water, either by dredges, or being left almoſt dry by the ebbing of the tide. The blown ſand is accounted of no uſe: and, in general, if ſand be only well drained of ſalt-water, ſo that it can be conveniently carried, it is better than that which has lain long drying in the ſun and wind, which takes off much of its virtue.

"Theſe uſeful ſands are carried by lighters as far up into the country as the tides will ſerve for that purpoſe, and there they are caſt on ſhore. From thence they are fetched, in ſome places, by wheel-carriages; but in moſt, by reaſon of the hilline's, narrowneſs, and badneſs of the ways, on horſeback; one horſe carrying about thirteen or fourteen gallons. One man drives ſeven or eight of theſe horſes, tailed together, to the diſtance of nine or ten miles from the ſand-place; and each horſe-load comes to about eight-pence or nine-pence, in ſome places; though not ſo much in others: for where it is dredged out of the ſea, it coſts but twelve or thirteen ſhillings the lighter, containing ſix-ſcore horſe-loads, at the landing-quay, or ſand-place; and where it is loaded from the dry-beach, after the ebb, it is not above four ſhillings the lighter, excluſive of the land-carriage, which is computed at about thirty-two thouſand pounds a year, in the whole of that country.

"When this ſand is brought home, it is ſpread on the ground intended for wheat; or uſually in the firſt crop of four, whatever be the grain. For after four crops, the Corniſh farmers generally leave their land to paſture for ſix or ſeven years, before they till it again: and indeed the graſs is ſo good, immediately after tillage, that they commonly mow it the firſt year, and which they call mowing of gratten.

"The Corniſh acre contains eight-ſcore yards, of eighteen feet to the yard. On one of theſe acres, if near the ſand-place, good huſbandmen beſtow three hundred ſacks, or horſe-loads: if within the reach of three turns a day, two hundred; if within two turns, one hundred and fifty; where only one turn can be made, eighty or an hundred; and ſo in proportion at greater diſtances, even to twenty or thirty ſacks on an acre rather than none.

"The effect generally is, that where much ſand is uſed, the ſeed is as much as the ſtraw little. Land thus manured has produced barley, of which the ear has been as long as the ſtalk it grew on. But where leſs ſand is uſed, there is but little, and that little hungry grain." *Philoſoph. Tranſact. Numb.* 113.

Where this excellent manure is found, it is taken up by a large bag of the ſtrongeſt canvas, to the mouth of which is fixed an iron hoop, or frame, to keep it open, and ſink it to the bottom of the ſea, that it may take up the ſand and coral, as it is dragged along by the bargemen. The Rev. Mr. Borlace ſays, that a barge-load, which is uſually delivered for ten ſhillings, or leſs, if near the place of dredging, will dreſs an acre, provided the land be tolerably good.

Large quantities of this ſhelly ſand lie neglected on moſt of the coaſts of England. The benefits ariſing from it, particularly when laid on clayey grounds, are indeed ſomewhat ſlow, but they are very laſting. The improvement is not the firſt or ſecond year; becauſe this manure conſiſts of hard bodies, ſuch as the ſand itſelf, ſhells, fragments of coral, and other calcarious ſubſtances, which require time to diſſolve them, and which afterwards enrich the land for many years. The beſt is that which is mixed with coral, and other hard ſubſtances of that kind. It gives the heat of lime, and the fatneſs of oil, to the land it is laid upon. Being more ſolid than ſhells, it contains a greater quantity of fermenting particles in an equal bulk; nor does it diſſolve into the ground ſo ſoon as ſhells, but decaying more gradually, continues longer to impart its warmth to the juices of the earth.

Similar to this is the practice in Ireland, in that part of the bay of Londonderry, called Loughfoil, towards the eaſtern ſide of which lie ſeveral banks, about the level of low water. They are formed of the ſhells of ſeveral ſorts of ſea-fiſh, particularly periwinkles, cockles, limpets, &c. The country people go thither with boats, and take loads of theſe ſhells, which they leave in heaps on the ſhore, till they are well drained, and thereby

thereby rendered lighter for farther carriage. They then carry them in boats as far as the river will allow, and afterwards in sacks on horses, six, seven, or more miles up in the country. They allow sometimes forty, but more commonly eighty barrels to an acre. These shells agree with boggy, heathy, clayey, wet, or stiff land, but not with sandy. They seem to give the land a sort of ferment, as yeast does to bread, opening and loosening the clods, and by that means making way for the roots to penetrate, and the moisture to enter into the fibres of the roots. This manure continues so long, that the archbishop of Dublin, from whom this was communicated to the Royal Society, could not find any person able to determine the time of its duration.

The reason of its long continuance seems to be, that the shells melt every year a little, till they are all spent, which requires a considerable time; whereas lime, &c. operates, in a manner, at once. But it is to be observed, that, in six or seven years, the ground becomes so mellow, that the corn which grows on it cannot support itself, and the land must be suffered to lie a year or two, that the ferment may be a little quieted, and the clods harden; after which it will bear as long again, and continue so to do, with the like intermission, for twenty or thirty years.

The good and lasting effects of shelly sand, for the improvement of clay, afford a strong presumption that there is an acid in the clay, which the shells absorb or correct: for when that acid is removed, the clay becomes more easily soluble, or miscible with water, or, as the farmers term it, is rendered mellow. This is contrary to the opinion of a very ingenious gentleman, Dr. Home, who, because he could not separate an acid from clay, concluded that there was none in it. That the first object in the improvement of clay is the destroying of this acid, is pretty evident from the qualities of all the substances useful for this purpose; every one of them being of the calcarious kind. The tenacity of clay does not seem to be owing to the smallness and unctuous smoothness of its particles; for in this some marles exceed it, and yet are perfectly and easily soluble in water, probably because they are of a calcarious nature: and if clay be rendered in some degree calcarious, by the addition of alcaline or calcarious substances, so long as it continues in that state, it is said to be mellow; that is, it is soluble like marle, and continues fit for the production of plants, till the acid in the air either neutralizes the alcali, or so far impregnates the calcarious substances, that they can no longer attract the acid. If this be fact, as it seems to be, common sand can be of little use; because the clay will cling as close to a stone, or grain of sand, as it would to part of itself, if the stone, or sand, does not so far change the body of the clay, as to take off its tenacity; and therefore Dr. Cox seems to be very right in saying, that the sand which is formed by the grating of stones only, is of little use as a manure. However, as some eminent writers on this subject strongly recommend sand in general, though they all agree in giving the preference to sea-sand, it may not be amiss to hear what they have said on the subject.

Columella, speaking in general terms, says, that his uncle used to carry sand on clay, and, on the contrary, bring clay on sandy grounds, with good success.

Mr. Worlidge says, that the best sand for fertility is that which is washed from hills or other sandy places by the violence of rain; and that sands which are dry have little fertility in them. *Systema Agriculturæ, p.* 67.

Mr. Bradley, after dividing sand into two general sorts, as Dr. Lister does, viz. the soft, round grained sand, such as is found in bogs and hills; and the sharp or rag-sand, as it is commonly called, taken from the bottom of rivers, the sides of high-ways, or the sea; advises laying even the former on heavy soils, especially if it happens to be mixed, as it sometimes is, with rotted vegetable or animal substances: to which he adds, that its efficacy will be increased by the addition of sand of a sharper nature, about a load of which last if used alone, should be spread upon every rod of very stiff land: for a sufficient quantity of it must be allowed, or else the clay will soon overcome it. *Complete Body of Husbandry, p.* 84.

"The use of sand, says Mr. Miller, is to make the clayey earth fertile, and fit to feed vegetables, &c. for earth alone is apt to coalesce, and gather into a hard coherent mass, as is apparent in clay; and earth thus glued, as it were, together, is no way disposed to nourish vegetables: but if sand, &c. that is, hard crystals, which are not dissolvable in water, and still retain their figure, be intermixed with such earth, they will keep its pores open, and the soil loose and incompact, by which means the juices will circulate, and plants are nourished thereby. By means of sand, the earth is rendered, in a manner, organical; pores and interstices being thereby maintained, somewhat analogous to vessels, by which the juices may be conveyed, prepared, digested, circulated, and at length excerned, and thrown off into the roots of plants." *Miller's Gard. Dict.*

Small gritty gravel operates in nearly the same manner, as an opener of the earth, and is strongly recommended by Mr. Evelyn, Mr. Worlidge, Mr. Bradley, and Mr. King. Good crops have been produced by very stiff and sour land, after it has been manured with gravel, which, to fit it for this purpose, should be skreened, or sifted, so as to leave among it as few stones as possible.

Shell-marle, or any marle, which makes a strong effervescence when an acid is dropped upon it, is a particularly good manure for clay; because dissolving easily in water, it gives a sufficiently free passage to this fluid, by which means the clay is kept dry even in winter: and if the soil be of a cold sour nature, the absorbent quality of the marle destroys that mineral acid, and keeps the ground warm.

The fossile-shells which have been found in some countries at a great distance from the sea, are a good manure, if they still retain their quality of shells: but besides their being generally petrified, they never are so serviceable as those which are taken from the sea-shore.

All animal and vegetable substances are likewise proper manures for clay. *See the article* MANURE.

The alcaline quality of the ashes of all vegetables, and the calcarious quality of coal-ashes, render them singularly beneficial to stiff and sour land, for which purpose they are successfully used in the neighbourhood of some great cities where coal is burnt for fuel. They open clayey grounds, and correct their bad qualities. The gardeners and farmers about London know their value, and make a very profitable use of them, particularly

larly to bring into order thoſe grounds which have been dug for brick-earth. After ſpreading theſe aſhes upon the clay-bottom, they either ſow horſe-beans, or ſet the early Spaniſh, or, ſometimes, the Windſor-bean, in thoſe ſpots; or elſe they lay ſuch lands down with rye-graſs, which generally ſucceeds very well. Mr. Bradley, blaming the people of Staffordſhire, and the counties adjoining, where there are coal-pits, for not improving their many heavy grounds around thoſe pits, by manuring them with coal-aſhes, which might eaſily be burned out of the waſte-coal, ſays, "That wherever there are plenty of coal-pits, there can be no want of good profitable land." On the ſame principle, we may account for the effects of the calcination of earth, commonly called, burn-baking, or Devonſhiring. *See the article* BURN-BAKING.

Lime, as it is generally uſed, is not found to be of ſo great ſervice in the improvement of clay, as a long eſtabliſhed practice might give room to think, or its qualities reaſon to expect; becauſe its particles are ſo extremely ſmall, that when ſeparated, or mixed with the clay, they ſoon become part of its body, and, being ſo much divided, are ſpeedily ſaturated by the acid, either in the clay, or in the air: the beſt method therefore, of uſing lime as a manure for clay is, to ſpread the lime-ſtone unburnt; in which original ſtate acids effervеſce ſtrongly with it, and therefore it will be likely moſt effectually to mellow the clay. It is likewiſe, in this its natural ſtate, attended with the farther advantage of ſaving the expence of burning, and becomes a very laſting manure; nay, probably a perpetual one, if the ſtones are broke into ſmall pieces, which is the proper method of uſing it; as is practiſed at Horneton in Oxfordſhire, where they manure their land with a ſort of ſtone, common in thoſe parts; and about Devonſhire, where a kind of red rock, very tender, and eaſily broken into ſand, is found to be of extraordinary ſervice to clay, or other ſtiff ſoils: for any ſoft ſtone, broken ſmall, will be of advantage to cold lands, if laid upon them. We find by Pliny, that lime was uſed as a manure by the antient Britons, whoſe lands were thereby rendered extremely fertile.

Mr. Evelyn adviſes uſing lime a little ſlacked for cold wet grounds, and ſtiff clays; and obſerves, that it is apt to over-heat dry ſoils.

Chalk operates in nearly the ſame manner as lime: but, as Mr. Liſle juſtly remarks, if it be laid on clay, it will in time be loſt, and the ground will return again to its former condition of clay; as we have already mentioned under the article chalk. *See* CHALK.

Soft pure clay contains a large proportion of very fine particles, more perhaps than any ſoil uſually cultivated by farmers, as may be diſcovered by diſſolving them in water, and after being well mixed, ſuffering them to ſubſide, which they do in a longer or ſhorter time, in proportion to the fineneſs of their parts. In making this experiment it is found, that the finer parts of clay remain ſuſpended in the water for many days, being nearly of the ſame ſpecific gravity as the water. When they are ſubſided, and the water ſuffered to evaporate, the clayey particles unite again, and cohere as ſtrongly as before. This ſtrong coheſion of the parts of clay, is the cauſe that the roots of ſtrong plants penetrate the clayey ſoils with difficulty, and that weak roots cannot penetrate ſuch ſoils at all. Horſe-beans for example, which have ſtrong roots do with ſome aſſiſtance of manures, make their way into ſtrong clays, while the weak rooting carrot is entirely ſhut out, and ſtarves in the ſoil that furniſhes abundance of nouriſhment to beans. Clay planted with weak rooting plants appears to be a barren earth; but when clay is opened, and impregnated by the influences of the atmoſphere, it becomes a rich paſture for plants: ſo that it may be ſaid that land is more or leſs fertile in proportion to the quantity of clay it contains; or which is nearly the ſame, in proportion to the quantity of very fine parts in it.

As the ſeparating or dividing the fine particles of clay, is the principal means of rendering it fertile, there are ſeveral mixtures or manures, adapted to break the ſtrong coheſion of the clayey particles, and theſe act in different manners, but all to the purpoſe of diſuniting the particles of the clay.

1. Dung, and other putreſcent manures, are great enrichers of clay; they open the clay by fermentation, which is a very powerful agent; but the action of theſe manures is of ſhort duration, and when the fermentation ceaſes, the clay returns again to its former ſtate of coheſion.

2. Sand of various kinds, which though of ſo hard a quality as not to furniſh any fertile matter to the clay, yet by inſinuating into it, and dividing the fine parts of the clay, renders it ſuſceptible of the riches contained in the air or atmoſphere.

3. Chalk, which is a body conſiſting alſo of very fine parts; and theſe appear to have one quality in them, that adapts them in a particular manner to open, and keep open the particles of clay; for chalk is of a very dry nature, and the parts when once ſeparated, appear to have a repulſive quality, and do not, as clay, unite: again in this ſeems to conſiſt chiefly the great benefit of chalk, as a manure to clayey land. Chalk by dividing and keeping open the fine parts of the clay, not only admits the fertilizing influences of the air to enter into it, but likewiſe makes way for the ſuperfluous moiſture of the clay to run off, which was the cauſe of that coldneſs in clayey land, which is unfavourable to vegetation: this is confirmed by experience: clays, when opened, become drier and warmer, and produce their crops earlier than they did before.

Other calcarious bodies have, in ſome degree, the ſame effects upon clays as chalk; and thoſe kinds of marle that contain the greateſt proportion of calcarious earth in them, are the moſt proper to be laid on clays.

Froſt is a moſt powerful pulverizer of clays when they are dry: in order to receive the greateſt benefit by froſt, the clayey ſhould be ploughed up in autumn, or beginning of winter; and not harrowed, but ſuffered to remain rough during the winter: in this ſtate the ſand or chalk ſhould be laid upon it. The froſt will penetrate the clods expoſed to it on all ſides, and as ſoon as the froſt breaks they will fall down fine by harrowing, which will mix the chalk with the ſoil; and if at the ſame time the land is dreſſed with dung, warm compoſt, or ſuch other warm putreſcent manure as can be ſpared, and harrowed in with the chalk, theſe will lay the foundation of a laſting improvement.

CLAYEY, mixed with clay, partaking of the nature of clay.

CLAY-LANDS, ſuch as partake of the nature of clay. *See the article* CLAY.

The natural produce of clay-lands, with regard to woods, is gooſe-graſs, or wild tanſey, large daiſies, thiſtles, docks, May-weed, poppies, &c.

CLEARING, a term uſed in threſhing corn, to ſignify a heap large enough to winnow.

CLEDGY, ſtiff, ſtubborn, hard, tenacious, mixed with clay.

CLETCH, a brood, as of chickens, &c.

CLOD, a lump of earth or clay.

CLODDING-BEETLE, a large beetle uſed in ſome parts of England for breaking the clods. This operation may be much ſooner performed, and at far leſs expence, by the ſpikey-roller. *See the article* SPIKEN-ROLER.

CLOVER, the name of a well known plant, and of which there are a great variety of ſpecies; but only three of them cultivated in the open fields for the food of cattle. viz. the red Dutch clover, the white Dutch clover; and the hop-clover.

The firſt ſort is ſufficiently known in England by the name of red clover, and therefore needs no deſcription. It is called by Linnæus, *Trifolium caule erecto, foliolis oblongo-ovatis integerrimis, ſpicis ovatis, calycibus ſetaceis.*

Since red-clover has been cultivated in England, great improvements have been made in clay-lands, which before produced little except rye-graſs, and other coarſe bents; but, being ſown with red-clover, have produced more than ſix times the quantity of fodder they formerly did: whereby the farmers have been enabled to feed a much greater ſtock of cattle, than they could do before, with the ſame extent of ground, which has, at the ſame time, enriched the ſoil, and prepared it for corn; and hence it is now common, where the land is kept in tillage, to lay down their ground with clover, after having had two crops of corn, whereby there is a conſtant rotation of wheat, barley, clover, or turnips, on the ſame land. The clover-ſeed is generally ſown with the barley in the ſpring; and when the barley is taken off, the clover ſpreads and covers the ground; and this remains two years, after which the land is ploughed again for corn.

Clover is a biennial plant, whoſe roots decay after they have produced ſeeds; but by eating it down, or mowing it, when it begins to flower, it cauſes the roots to ſend out new ſhoots, whereby the plant is continued longer than it would naturally do. The common allowance of ſeed for an acre of ground is ten pounds. In the choice of the ſeed, that which is of a bright yellow colour, inclining to brown, ſhould be preferred; and the pale coloured thin ſeed ſhould be rejected. The clover-ſeed ſhould be ſown after the barley is harrowed in, otherwiſe it will be buried too deep; and after the ſeeds are ſown, the ground ſhould be rolled, which will preſs the ſeeds into the ground; but this ſhould be done in dry weather, for moiſture will often cauſe the ſeeds to burſt; and when the ground is wet, the ſeeds will ſtick to the roller. The above is the method generally practiſed by moſt people, in ſowing this ſeed with corn: but it will be much better if ſown alone; for the corn prevents the growth of the plants till it is mowed and taken off the ground, ſo that one whole ſeaſon is loſt; and many times, if there be a great crop of corn upon the ground, it ſpoils the clover, ſo that it is hardly worth ſtanding; whereas, when it is ſown without any other ſeed, the plants will come up more equal, and come on much faſter than that which was ſown the ſpring before under corn.

It is therefore adviſable to ſow the ſeed in Auguſt, when there is a proſpect of rain ſoon after; for as the ground is, at that ſeaſon, warm, ſo the firſt ſhower of rain will bring up the plants, and theſe will have time enough to get ſtrength before winter: and if the clover be well rolled ſome time in October, when the ground is not too wet, it will preſs the ground cloſe to the roots, and cauſe the plants to ſend out more ſhoots: the ſame ſhould be repeated in March, which will be found very ſerviceable to the clover. The reaſon for preferring this ſeaſon rather than the ſpring, for ſowing the ſeeds, is, becauſe the ground is cold and wet in ſpring, and if much rain falls after the ſeeds are ſown, they will rot in the ground; and many times when the ſeed is ſown late in the ſpring, if the ſeaſon ſhould prove dry, the ſeeds will not grow. The other ſeaſon is therefore the ſureſt, and conſequently ſhould be preferred.

The moſt uſual time however, of ſowing the red or broad clover, is in the ſpring; for though it will come up well if ſown in autumn, it is, while young, very liable to be killed by froſt; and many crops of it that have come up finely in autumn, have been totally deſtroyed by the froſt in winter; eſpecially in ſtrong moiſt ſoils, upon which it commonly produces the greateſt crops, if ſown in the ſpring.

About the middle of May this graſs will be fit to cut, when the greateſt care ſhould be taken in the making it into hay; for it will require a great deal more labour and time to dry than common graſs, and will ſhrink into leſs compaſs; but if it be not too rank, it will make extraordinary rich food for cattle. The time for cutting is, when it begins to flower; for if it ſtands much longer, the lower part of the ſtems, and the under leaves will begin to dry, whereby it will afford a leſs quantity of hay, and that not ſo well flavoured.

Some people cut three crops in one year of this graſs; but the beſt way is to cut only one in the ſpring, and feed it the remaining part of the year, whereby the land will be enriched, and the graſs will grow much ſtronger.

One acre of this plant will feed as many cattle as four or five acres of common graſs; but great care ſhould be taken of the cattle when they are firſt put into it, leſt it fill them with wind and kill them, which is called their being hoven. *See the article* HOVEN.

In order to prevent this accident ſome turn them in for a few hours only at firſt, and ſo ſtint them as to quantity; and this by degrees, letting them at firſt feed one hour only in the middle of the day, when there is no moiſture upon the graſs, and ſo every day ſuffer them to remain a longer time, until they are fully ſeaſoned to it: but great care ſhould be taken never to turn them into this food in wet weather; or if they have for ſome time been accuſtomed to this food, it will be at leaſt proper to turn them out at night in wet weather, and let them have hay, which will prevent the bad conſequences of the green clover. Others give their cattle ſtraw while they are feeding upon this graſs, to prevent the ill effects of it; but this muſt not be given them in the field, becauſe they will not eat it, where there is plenty of better food. There are others who ſow rye-graſs among their clover, which they let grow together, in order to prevent

prevent the ill conſequences of the cattle feeding wholly on clover; but this is not a commendable method, becauſe the rye-graſs will greatly injure the clover in its growth, and the ſeeds will ſcatter, and fill the ground with bent.

When the ſeeds are intended to be ſaved, the firſt crop in the ſpring ſhould be permitted to ſtand until the ſeeds are ripe, which may be known by the ſtalks and heads changing to a brown colour, when it ſhould be cut in a dry time; and after being well dried, it may be houſed till winter, when the ſeeds ſhould be threſhed out; but if the ſeeds are wanted for immediate ſowing, it may be threſhed before it be houſed or ſtacked; but it muſt then be well dried in the field, otherwiſe the ſeeds will not quit their huſks.

It has been a common complaint among the farmers, that they could not threſh out theſe ſeeds, without great labour and difficulty; but this is chiefly owing to their cutting their ſpring crop, when it begins to flower, and leaving the ſecond crop for ſeed; which ripening ſo late in autumn, there is not heat enough to dry the huſks ſufficiently; whereby they are tough, and the ſeeds rendered difficult to get out. This complaint may therefore be entirely removed by leaving the firſt crop for ſeed, as above directed; and then the ground will be ready to plough and prepare for wheat the ſame year, which is another advantage.

When cattle are fed with this hay, the beſt way is to put it in racks, otherwiſe they will tread a great deal of it down with their feet. This ſeed is better for moſt other cattle than milch cows, ſo that theſe ſhould have very little of it, leſt it ſhould prove hurtful to them; though it is not near ſo injurious to any ſort of cattle when dry, as it is when green.

The ſecond ſort, namely, the white Dutch clover, grows naturally in moſt of the paſtures in England, and is generally known among the country people, by the name of white honey-ſuckle. Linnæus calls it, *Trifolium capitulis umbellaribus leguminibus tetraſpermis, caule repente*

This is an abiding plant, whoſe branches trail upon the ground, and ſend out roots from every joint, ſo that it thickens and makes the cloſeſt ſward of any of the ſown graſſes; and it is the ſweeteſt ſeed for all ſorts of cattle yet known: therefore when land is deſigned to be laid down for paſture, with intent to continue ſo, it ſhould be ſown with the ſeeds of this plant. The uſual allowance of this ſeed is eight pounds to one acre of land; but this ſhould never be ſown with corn, for if there is a crop of corn, the graſs will be ſo weak under it, as to be ſcarce worth ſtanding; but ſuch is the covetouſneſs of moſt farmers, that they will not be prevailed on to alter their old cuſtom of laying down their grounds with a crop of corn, though they loſe twice the value of their corn by the poorneſs of the graſs, which will never come to a good ſward, and one whole ſeaſon is alſo loſt; for if this ſeed is ſown in the ſpring without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. The ſeed of this ſort may alſo be ſown in autumn, in the manner before directed for the common red clover; and this autumnal ſowing, if the ſeeds grow kindly, will afford a good early crop of hay the following ſpring; and if, after the hay is taken off the land, the ground be well rolled, it will cauſe the clover to mat cloſe upon the ground, and become a thick ſward.

The ſeeds of this white Dutch clover is annually imported from Flanders, by way of Holland, whence it received the name of Dutch clover: not that it is more a native of that country than of this, for it is very common in moiſt paſtures, in every county in England: but the ſeeds were never collected for ſowing in this country, till of late years; nor are there many perſons here, even now, who ſave this ſeed; though it may be done if the ſame method as is practiſed for the red clover be taken with this ſort: it ſhould therefore be recommended to every farmer, who is deſirous of improving his land, to ſow carefully an acre or two of this white clover for ſeed, which will ſave him the expence of buying for ſome years, when the price is great; and there will be a ſure market for any quantity he may have to ſpare.

The reader will find a farther account of this graſs under the article PASTURE.

The third ſort, namely hop-clover, called by ſome yellow meadow trefoil, and by botaniſts, *Trifolium ſpicis ovalibus imbricatis, vexillis deflexis perſiſtentibus, calycibus nudis, caule erecto*, grows naturally among the graſs in the upland paſtures of this country; but the ſeeds are frequently ſold in the ſhops, and are by many mixed with the other ſorts of clover and graſs-ſeeds, for laying down ground to paſture. This plant grows with upright branching ſtalks about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oblong and heart-ſhaped, but reverſed, the narrow point joining the foot-ſtalks. The flowers, which are yellow, grow from the wings of the ſtalk, upon long foot-ſtalks, collected into oval imbricated heads, having naked impalements lying over each other like ſcales, ſomewhat like the flowers of hops, from whence the plant had the name of hop-clover. But there are two ſorts of this clover, which grow naturally in England. The other is a much ſmaller plant than this, and generally known by the name of none-ſuch, or yellow hop-trefoil. *See the article* NONE-SUCH.

The hop-clover is ſtrongly recommended by the following circumſtances. 1. It not only grows, but flouriſhes on the moſt barren ſands, and therefore muſt be a very proper graſs to cultivate on ſuch unfertile ſoils, where any other graſs that is worth notice will not grow at all. 2. It is not apt to ſwell cattle, as the red clover does. 3. In good ground it will continue long, and bear a very good ſeed or crop, as Mr. Tull, though prejudiced againſt clovers, confeſſes; and, by its flouriſhing both on ſands and clay, which have not been ploughed for many years, it ſeems likely to continue long in any ſoil.

CLOUGH, a valley between two ſteep hills. It alſo ſignifies a cliff.

CLOUT, an iron plate on the axle-tree of a carriage.

CLUMP, a number of trees growing together without ſhape or order.

CLUNG, cloſed up, or ſtopped; ſpoken of hens when they do not lay. It is alſo applied to wood, or any other thing that is ſhrivelled, or ſhrunk up, when it is ſaid to be clung.

CLUSTER, a bunch, a number of things of the ſame kind growing or joined together. Alſo a num-

ber of animals, or a body of people, collected together.

M. de Chateauvieux has made a very remarkable experiment on ſowing corn in cluſters, which muſt not be omitted here.

" It is of great conſequence, ſays that ingenious and aſſiduous cultivator, to know which is the moſt profitable way of ſowing beds with corn; I mean, that by which they will be ſtocked with a proper number of plants; for when too much ſeed is ſown, the plants hurt one another; and when too little, the earth is not enabled to produce ſo much as it is capable of doing.

" The buſineſs therefore is to determine what number of plants would be moſt advantageous. Luckily the difference is wide enough between the too great, and the too ſmall number; and the produce of the crop can only be diminiſhed by an exceſs one way or the other.

" But whatever certainty we may acquire with reſpect to this intereſting point, we cannot flatter ourſelves that we ſhall be always able to keep it in our practice. The various accidents to which corn is liable, from the hour of its being ſown till it is reaped, will always fruſtrate the methodical arrangement which we may have intended to give the plants.

" The difficulty of ſucceeding in this enquiry ought not however to diſcourage us: for it would be attended with ſuch advantages, as would make very ample amends for all the labour beſtowed upon it. Let us then have recourſe to experiments. Thoſe that are made with this view can never be quite uſeleſs. If they do not lead us to the very thing we are in ſearch of, they may at leaſt diſcover to others what may be of ſervice.

" According to our principles, the diſtance between each plant ought to be equal throughout the whole length of the rows, that all of them may have an equal quantity of earth to draw their nouriſhment from.

" Several experiments have ſhewn, that ſix inches is not too great a diſtance for the plants to be at from one another. In this caſe it would be ſufficient to ſow one grain of wheat at every ſix inches diſtance. According to this diſpoſition, a field well prepared ought to produce the greateſt crop. The plants will commonly branch out ſo as to have twenty, thirty, or forty ſtalks: I have had ſome with upwards of eighty. It is pity that this exact diſtribution of the ſeed cannot ſubſiſt long. An accident I lately met with ſoon convinced me that it was neceſſary to increaſe the quantity of ſeed, and that very conſiderably.

" This does not, however, yet hinder me from thinking, that if any eaſy method could be found to have a plant of wheat exactly at every ſix inches diſtance in the rows, it would be the beſt way of ſowing lands. I have often conſidered how this could be reduced to practice, as well to ſatisfy my curioſity, as to enable me to proceed with more certainty in my operations. When a theory is known to be good, we are ſtrongly encouraged to draw all poſſible advantages from it for the practical part; we proceed with confidence and pleaſure.

" Experience having convinced me that it never would be poſſible to have a plant at every ſix inches in each row, by ſowing only a ſingle grain of wheat at thoſe diſtances, it naturally followed, that the way to have the ground better covered with plants was, to ſow more grains. The next queſtion was, how many grains ſhould or ought to be ſown in each place? Should it be two, three, or more? Experience only could anſwer this queſtion. I therefore tried the following experiment. I ſowed a different number of grains in cluſters, ſix inches diſtant from each other, putting one grain in the firſt, two in the ſecond, and ſo on to the ſixth, which had ſix grains: then I began again, and went on as before, till the whole length of the row was ſowed in this manner. The produce of each cluſter was to ſhew me whether it would be beſt to double, triple, or quadruple the ſeed, which it was plain had been ſown too thin, when a ſingle grain was dropt at every ſix inches.

" The winter of 1753 was already far advanced when theſe thoughts firſt occurred to me. It was then too late to try this experiment with wheat; but that I might not loſe a year, I did it in the ſpring with barley; not doubting but that corn, which is uſually ſown in March, might furniſh me with ſome future hints for the culture of that which remains longer in the ground.

" Accordingly on the ninth of April 1754, I ordered another bed to be ſowed with barley in my preſence, and in the manner I have juſt related. I counted all the grains of each cluſter myſelf. They were ſown in three rows. I varied the experiment in the rows next the ſouth, by ſowing no cluſters there of leſs than three, four, five, or ſix grains: which I continued the whole length of the row. At harveſt, all the cluſters in which ſeveral grains had been ſowed, were ſo thick, that they touched one another.

" What is of moſt conſequence to our culture is, to know the produce of each cluſter. But it will be neceſſary previouſly to obſerve, that the cluſters were ſown in rows extending forty feet in length, and that the beds were five feet wide.

" Reſults:

The *South row.*

ſowed with 6, 5, 4, and 3 grains,
produced 661, 624, 447, and 493 ſtalks.
In all 2225 ſtalks.

" *The Middle row.*

ſowed with 1, 2, 3, 4, 5, and 6 grains,
produce 48, 72, 147, 204, 219, and 487 ſtalks.
In all 1177 ſtalks.

" *The North row.*

ſowed with 6, 5, 4, 3, 2, and 1 grain,
produce 502, 372, 345, 276, 200, and 92 ſtalks.
In all 1787 ſtalks.

" Conſequently the whole number of ſtalks in the three rows was 5189. They yielded ſeventeen pounds of grain, beſides a very conſiderable quantity ſhed in cutting.

" On the footing of this crop, an arpent of thirty-ſeven ſquare toiſes (equal to about one acre and three quarters of a rood Engliſh) would contain at leaſt forty-four

four beds five feet wide, which was the breadth of the beds on which this experiment was made. The beds would be 222 feet long: the produce of one of them would be ninety-three pounds, eight ounces; and that of the forty-four, 4138 pounds, eight ounces; a very conſiderable crop, and which might be carried ſtill further by other experiments of the ſame kind.

"The following obſervations deſerve the reader's utmoſt attention. Firſt, by this experiment, I have very nearly effected what I aimed at, viz. to have two or more plants grow ſo cloſe together, as to ſeem but one; and that at ſix inches diſtance from each other. If the three rows had been joined together length-ways, they would have been 120 feet long, and ought to have contained 240 plants only: but the diſtances, which were marked by gueſs, not being exactly ſix inches each, ninety-ſix cluſters were ſown in each row, which made ſixteen cluſters over and above. By this means ſeveral of them were nearer than ſix inches to one another.

"Two hundred and eighty-eight cluſters were ſown, all of which produced plants, except twenty-five, which either did not ſprout, or the plants periſhed. This deficiency is not very conſiderable; but we muſt obſerve, 1. That almoſt all the places where this happened had been ſown with only one or two grains of corn. 2. That it was in the middle row that the greateſt number of plants was wanting. 3. That the ſouth row, in which the ſmalleſt quantity ſown for any one tuft, was three grains, furniſhed and retained its full number of plants: and laſtly, that almoſt all thoſe which were next to the vacant ſpaces, were ſtronger than the reſt, and thereby made amends for the loſs of the others.

"Secondly, the whole number of the ſtalks amounted to 5189, which is after the rate of forty-three ſtalks and a quarter to a foot: but it is much more conſiderable in the ſouth row, which having produced in all 2225 ſtalks, the proportion is fifty-five and a half to a foot. The cauſe of this difference is eaſily ſeen. The expoſition of that row to the ſouth being more favourable than that of the others, may have contributed thereto; but it was very plain that it was chiefly owing to none of the cluſters in that row being ſown with ſo few as one or two grains.

"Thirdly, we ſee that the increaſe of the ſtalks was, in general, in proportion to that of the ſeed; only the cluſters that were ſown in three grains in the ſouth row, produced forty-ſix ſtalks more than thoſe which were ſown with four grains; but ſtill the general reſult of the three rows was exactly in the ſame progreſſion, as appears by the following recapitulation:

RECAPITULATION.

Stalks produced by	1 grain - - -	140
	2 gr. - - -	272
	3 gr. - - - -	916
	4 gr. - - - -	996
	5 gr. - - -	1215
	6 gr. - - -	1650
	Total	5189

"Fourthly, the ears were nearly equal, at leaſt in two thirds of the length of the rows: the other third ſurpaſſed the reſt very conſiderably.

Fifthly, the difference between the produce of the cluſters ſowed with one, and with ſix grains, is extremely great. The former produced but 140 ſtalks, the other multiplied to 1650. It is true the number of the cluſters of ſix grains is greateſt, which is ſome ſmall diminution of this difference.

"Sixthly, I obſerved ſeveral ſtalks from which others had ſhot out, all as ſtrong, and as long, as thoſe from which they derived their origin. They proceeded from the firſt joint above the ſurface of the earth, generally at the height of three, four, or five inches, and were two, three, and ſometimes four in number. I never perceived this kind of multiplication before; but had till then always obſerved it to be at the neck, or point of ſeparation between the roots which deſcend, and the ſtalks which aſcend, that the ſtalks branched out.

"Seventhly, I ſuſpected, in the ſummer, what was the cauſe of the great vigour of the plants of this experiment; but I ſaw it much plainer after harveſt: for, upon pulling up ſome of the tufts of ſtubble, I found their roots innumerable. This fact is ſtrictly true. I could not count them upon any one plant that had more than fifteen or twenty ſtalks. Theſe roots were in ſuch bundles, and ſo confuſedly interwoven one with another, that after counting ſeveral hundreds of them, I was forced to give up the taſk. Their length and thickneſs was anſwerable to their number.

"I muſt now remind the reader of what I ſaid before, that the ſeveral accidents which I met with in my firſt experiments, ſhewed me it was neceſſary to increaſe the quantity of the ſeed. I did ſo, by ſmall degrees, from year to year. It is equally important for the ſucceſs of the New Huſbandry, not to run into another extreme, by loading the earth with more plants than it can nouriſh: the crop would be conſiderably diminiſhed thereby.

"It appears from this experiment, that the plants of the cluſters that were ſowed with ſix grains, did not hurt one another: on the contrary, their being ſown in that manner proved an advantage, ſince they produced much more than the others; whence it follows, that we may, without danger, extend the quantity of ſeed beyond the limits of the New Huſbandry. Its principles are not the leſs true; but they leave the farmer at liberty to uſe his own prudence in the application of them, according to the nature of the ſoil.

"Thoſe principles, which ſuppoſe that every plant is to ſubſiſt till harveſt, reduce the ſeed to a very ſmall quantity: but numbers of accidents deſtroy many of them. Our reaſon ought therefore to tell us, that without deviating too much from the principles we adopt, we may, and ſhould, judicioúſly ſtock our land with a ſufficient number of plants, in order to guard againſt unavoidable accidents.

"Still I may be aſked, what is the ſufficient quantity? I anſwer, that our experiment ſhews that ſowing ſix grains together in a cluſter, at the diſtance of ſix inches from each other, all the length of the rows, will not be found too thick. By following this rule, we may be almoſt certain that the whole ground will be ſtocked with a proper number of plants. This ought, however, to be looked upon only as a general propoſition, which it will be often proper to deviate from in the circumſtances we are going to mention.

" When the ſowing ſeaſon is favourable.
" When the land is well prepared.
" In countries where the winter is ſeldom ſevere.
" When the land is but little liable to inſects.
" When the land is not in danger of being hurt by too much drought, or too much wet.
" And laſtly,
" When the land is good, and very fertile.
" In all theſe and ſuch like caſes, leſs ſeed ſhould be ſowed; and, in the contrary caſes, more. Prudence, and a careful ſtudy of the nature of the ſoil, ought to be our guides. Two or three years experience will be ſufficient to ſhew us the practice that will be beſt to follow.

" It will be right to repeat our laſt mentioned experiment, and even to vary it. In all probability it will afford us ſtill greater lights. It will be right, for example, to ſow the cluſters with a greater number of grains, beginning with ſix, the produce of which is known, and going on to ſeven, eight, or even more, always in cluſters, till we come to a number at which the crop ceaſes to yield an equal profit. By this means the two extremes may be known, either of too much, or too little ſeed; and the juſt proportion will then be eaſily determined.

" Some farther alterations may likewiſe be made in this experiment. For example, I placed the grains in the earth ſo that they touched one another; they may be placed at ſome little diſtance, and ranged in a kind of circle of about three inches diameter. It is reaſonable to think, that the plants may then make a greater progreſs, as they will not all have one common center: ſome of them will be nearer the ploughed alley; their roots will reach it more eaſily than before, and will multiply there, which may render the plants more vigorous." *Du Hamel's Culture des Terres, tom.* IV.

CLUSTER-GRAPE, the ſmall black grape, generally called the currant.

COAL, the common foſſile fuel.

COAL-ASHES. *See the article Coal*-ASHES.

COAL-BALLS, a compoſition of culm, or the duſt and refuſe of pit-coal, mixed up with mud, clay, &c. burnt as fuel.

About Briſtol, Briſlington, and other places in the weſt of England, they commonly make coal-balls of their culm, or ſmall refuſe-coal, which would not otherwiſe be ſaleable.

The method of making theſe balls is, to take a certain quantity of the culm, and an equal quantity of ſleech, or mud left by the tide on the ſea-ſhore: theſe ingredients are firſt mixed groſsly with ſhovels, and then blended more perfectly with the hand: after which they are moulded into balls of about ſix inches diameter.

Theſe balls may either be burnt immediately as ſoon as they are made, or laid up and kept as long as the owner pleaſes, without ſuffering the leaſt damage.

The inhabitants of Croken-pill, near King-Road, about ſeven miles below Briſtol, are ſuppoſed to make them in the greateſt perfection. They ſeldom uſe any other fuel, and find it anſwers extremely well, being much cheaper than coal, making as good a fire, and laſting longer. They make it a rule to work as much culm into the ſleech with their hands, when they mould the balls, as they poſſibly can, without making them crumbly.

Theſe balls have not been uſed above thirty or forty years in the above parts; but are now greatly preferred, though they can have coals laid in at three-pence-half-penny the buſhel.

In Wales, where theſe coal-balls are alſo made, they uſe clay inſtead of the ſleech, allowing two parts of culm to one of clay, adding to the heap a ſufficient quantity of water, which they temper with it, in the ſame manner as if they were making mortar with lime and ſand. And, after the culm and clay have been ſufficiently mixed and tempered together, they form the whole into balls, in the manner above related.

The balls made with clay are not ſo pleaſant a fuel as thoſe made about Briſtol with ſleech, becauſe the clay is apt to emit a ſtinking ſmoke, eſpecially if the balls are burnt before they are dry: but notwithſtanding this inconvenience, which the lower ſort of people little regard, they afford the poor a good and cheap fuel.

It is ſurpriſing that ſome work of this kind is not undertaken in the neighbourhood of London, as it would greatly tend to leſſen the enormous expence to which the poor of the metropolis are every winter ſubject, for fuel; and could not fail of rewarding the undertaker for his trouble. Culm might be imported into the Thames very cheap, and nothing could be more ſuitable than the river mud to mix with it, in order to form the balls; it would, probably, do better than the ſleech, being of a richer, and more combuſtible nature.

COAL-SOOT, the ſoot collected in chimnies, &c. where coals are burnt. A correſpondent of the editors of the Muſeum Ruſticum has obliged the world with ſome uſeful obſervations on coal-ſoot as a manure. He obſerves that many farmers in ſome countries are at a great loſs to find a proper dreſſing for their meadows; and to ſuch he recommends the uſe of coal-ſoot as highly profitable and advantageous; its effects will be very viſible for upwards of three years, during which time no other manure need be laid on the land.

" Coal-ſoot, ſays he, is of a very warm refreſhing nature: it cheriſhes, and gives nouriſhment to the graſs; it kills the noxious inſects that infeſt the crop, and protects it from the effects of froſts, ſnows, and chilling rains; and, what is ſtill of greater conſequence, it will kill the moſs that often abounds in ſour meadows.

" I muſt not however fail noticing, that ſoot will not have theſe good effects if the meadow-land ſhould be ſo damp as to require draining: in this caſe, cuts muſt be made acroſs it, in proper directions, previous to the laying on the coal-ſoot, which would otherwiſe be of little ſervice.

" All rank weeds ſhould be carefully grubbed up from among the graſs, and that before they have perfected their ſeeds; without which precaution, in point of time, the work would be to do over again.

" The general quantity I lay on an acre of meadow-land is twenty-five looſe buſhels: more I find to be rather prejudicial, and leſs does not anſwer all the purpoſes we are to expect from this excellent manure.

" The beſt time for applying this dreſſing, I take to be the beginning of the ſpring: about February is the time I generally lay it on; the gentle rains which then, for

for the moſt part, enſue, waſh it into the land, and the following crop is greatly benefited by it. This is very ſoon viſible from the fine deep verdure which the graſs aſſumes.

" Some of my meadow-land is particularly ſubject to be damaged by froſts, ſnows, &c. on this I generally lay the proper quantity of ſoot in the beginning of November; and ſometimes, if the winter is likely to be ſevere, I venture to allow thirty buſhels to an acre, which in other caſes I never do.

" Having myſelf found great benefit by uſing this coal-ſoot as a manure for meadows, I am willing my brother farmers ſhould know it, that they may have it in their power to adopt the practice, if they approve of it.

" It will be well worth their while, provided they can have it at a reaſonable rate, which they may, if they do not live more than twenty miles from London, by land-carriage, and wherever there is a communication by water, though at almoſt ever ſo great a diſtance.

" Other great towns alſo, where ſea or pit-coal is burnt, may ſupply the farmers with it; but the misfortune is, that where it is in the greateſt plenty, they leaſt know the uſe of it.

" Great care however ſhould be taken to get it genuine and good, the merchant chimney-ſweepers, frequently to increaſe the bulk, mixing the fine ſifted coal-aſhes with it: this is a great fraud, but may eaſily enough, with proper care and circumſpection, be diſcovered; for the aſhes make the ſoot gritty, and increaſe its weight in a very ſenſible degree.

" Before I conclude, I muſt give my brother farmers a caution; which is, that they never lay the ſoot on their land in windy weather, as not only great part of it will be loſt and waſted, but the remainder will be ſo unequally diſpoſed, as to do rather more harm than good." *Muſeum Ruſticum. vol.* I. *p.* 218.

Coal-ſoot is alſo an excellent dreſſing for green wheat in February; it ſhould be ſown by hand, in quantity ſufficient to blacken the ground. This is frequently practiſed in Leiceſterſhire, and many other countries. It is of a warm nature, and therefore does moſt good on cold, moiſt, clayey ſoils.

COB, a wicker baſket to carry on the arm. Hence a ſeed-cob, or ſeed-lip, is a baſket for ſowing.

COCCIFEROUS *Plants*, ſuch as bear-berries.

COCK, the male of the hen; alſo the male of any ſmall birds.

COCKEREL, a young cock.

COCKLE, the ſame with darnel-graſs. *See* DARNEL-GRASS.

CODLING, a well known ſpecies of apple. *See the article* APPLE.

COFFIN, that part of the horn or hoof of a horſe which appears when he has his foot ſet on the ground.

COFFIN-BONE, that bone which lies within a horſe's hoof as in a coffin.

This bone is round upwards, where it receives the little paſtern, but grows broader and thinner towards its bottom; it is of a porous open contexture, like a piece of loaf-ſugar, and is eaſily pierced, and often wounded when horſes happen to take up nails or other ſharp bodies in the ſtreets or roads: accidents to which they are often liable, and are more eaſily cured than they would have been, had the bone been hard and ſolid.

COFFIN-JOINT, that where the leſſer paſtern joins the foot.

When the coffin-joint is ſtrained, a horſe often continues a long time lame, without the owner's diſcovering where the lameneſs lies; becauſe a horſe does not, at firſt, favour it much on the bending of the foot, only in planting his foot upon the ground: but in time there will grow ſuch a ſtiffneſs in that joint, that he will only touch the ground with his toe, and it will be impoſſible to play the joint with one's hand. The only method of removing this ſtiffneſs is bliſtering and firing, which generally ſucceeds, unleſs the ſtiffneſs and contraction has been of long ſtanding. *Gibſon's Farriery, vol.* II. *p.* 372.

COKE, pit-coal, or ſea-coal, charred. It is made by burning pit-coal in ovens conſtructed for that purpoſe, and extinguiſhing the fire in the ſame manner as is done for charcoal.

COLD, the name of a diſeaſe to which animals of almoſt every kind, particularly horſes, are very ſubject.

Colds are cauſed by an obſtruction of perſpiration: that is, the pores, or outlets of the ſkin, are ſo far ſhut up, that the ſteams of perſpirable matter are checked ſo that they cannot paſs off in their uſual manner. The conſequence of this is, they recoil on the blood, vitiate its quality, over-fill the veſſels, and affect the head, the glands or kernels of the neck and throat, the lungs, and other principal parts.

It would be endleſs to enumerate the various cauſes of colds; the moſt uſual are, riding horſes till they are hot, and ſuffering them to ſtand in that condition, where the air is cold and piercing; removing a horſe from a hot ſtable to a cold one, and too ſuddenly changing his cloathing; hence it is that horſes catch ſevere colds after they come out of dealers hands; and by not being carefully rubbed down, when they come in hot, off journeys.

The ſigns of a horſe's catching cold, are a cough, heavineſs, and dulneſs, which affect him more or leſs in proportion to the ſeverity of it; the eyes are ſometimes moiſt and watery, and the kernels about the ears, and under the jaws ſwell, the noſe gleets, and he rattles in his breathing; and when the cold is violent, the horſe will be feveriſh, his flanks work, and he will both loath his hot-meat, and refuſe his water. When theſe laſt ſymptoms are attended with a ſlimy mouth, ears and feet cold, and a great inward ſoreneſs, there is danger of a bad fever.

But when the horſe coughs ſtrong, ſnorts after it, is but little off his ſtomach, pricks up his ears, and moves briſkly, in his ſtall, dungs and ſtales freely, his ſkin feels kindly, and his coat does not ſtare, he is in no danger, and there will be no occaſion for medicines of any kind; but you ſhould bleed him about two quarts, keep him warm, and give him feeds of ſcalded bran, with as much warm water as he will drink, in order to dilute his blood.

If the diſorder ſhould increaſe, the horſe fall hot, and refuſe his meat, bleed him, if a ſtrong one, two quarts more; and if you are not ſatisfied, without giving medicines

dicines, avoid, as you would poiſon, a farrier's drench; which is generally compoſed of ſome hot nauſeous powders, given in a quantity of ale: which too often encreaſes the fever, by over-heating the blood, and palls the horſe's ſtomach by its loathſomeneſs. And inſtead of it, infuſe two ounces of anniſeeds, with a dram of ſaffron, in a pint and a half of boiling-water; pour off the clear, and diſſolve in it four ounces of honey; to which may be added four ſpoonfuls of ſallad oil: this drink may be given every night; or one of the following balls, provided there is no fever; in which caſe, it always will be more eligible to give two or three ounces of nitre, or ſal prunella, every day in his feeds, or water, till it is removed; but ſhould the horſe be inclined to coſtiveneſs, remember that his body ſhould be kept open by emollient clyſters, or cream of tartar diſſolved in his water, to the quantity of three or four ounces a day.

Take of the freſh powders of anniſeed, elicampane, carraway, liquorice, turmeric, and flour of brimſtone, each three ounces; juice of liquorice four ounces, diſſolved in a ſufficient quantity of mountain; ſaffron powdered half an ounce, ſallad-oil and honey each half a pound, oil of anniſeed one ounce; mixed together with wheat-flour enough to make them into a paſte.

Or, Take the following from Dr. Brachen.

Take anniſeed, carraway-ſeed, and greater cardamoms, finely powdered, of each one ounce, flour of brimſtone two ounces, turmeric in fine powder one ounce and a half, ſaffron two drams, Spaniſh juice diſſolved in water, two ounces, oil of anniſeed half an ounce, liquorice-powder one ounce and a half, wheat-flour, a ſufficient quantity, to make into a ſtiff paſte, by beating all the ingredients well in a mortar.

Theſe balls conſiſt of warm opening ingredients; and, given in ſmall quantities, about the ſize of a pullet's egg, will encourage a free perſpiration; but, in caſe of a fever, ſhould be cautiouſly continued. They are much more efficacious, and in all caſes ſuperior to the farrier's drenches, if diſſolved in a pint of warm ale.

This ſimple method, with good nurſing and hot maſhes, warm-water and cloathing, eſpecially about the head and throat, which promotes the running at the noſtrils, will anſwer in moſt ſudden colds; and when the horſe feeds heartily, and ſnorts after coughing, moderate exerciſe every day will haſten his recovery.

The ſcalded bran ſhould be put hot into the manger, for the ſteams conduce not a little to promote a running at the noſe, which is often very plentiful, and greatly forwards the cure. His manger ſhould be kept clean, by filling it with ſtraw; his hay well ſhook and ſprinkled with water, and given in ſmall quantities: for his breathing, at this time, taints the hay, and then he will not touch it.

To a horſe loaded with fleſh, a rowel may ſometimes be neceſſary, as may alſo a gentle purge or two, to ſome, when the diſtemper is gone off. *Bartlet's Farriery*, *p.* 26.

COLD-CHARGE, the name of a medicine much uſed by farriers for curing ſtrains, &c. It conſiſts of vinegar, bole, and the whites of eggs, mixed together to the conſiſtence of a poultice, and ſpread over the part hurt.

COLE, *or* RAPE, the name of a plant greatly cultivated, both on account of its ſeed, being that from whence the rape-oil is drawn, and alſo for feeding cattle. The botaniſts call it *napus ſylveſtris*, or wild navew.

The marquis de Turbilli, who has done more ſervice to agriculture than any other foreign writer, has lately publiſhed a memoire on the culture of cole-ſeed, as practiſed by the Flemiſh farmers, to whom we are indebted for many valuable improvements in huſbandry.

In the piece above-mentioned, the marquis obſerves, that all ſorts of cole-ſeed are cultivated in the ſame manner; and that all grow more or leſs towards their natural perfection, yield more or leſs ſeed, and this ſeed is of a better or worſe quality, according to the nature of the ſoil on which the cole-ſeed is ſown, the good or bad huſbandry beſtowed on it, the favourableneſs of the ſeaſon, and the manner in which it eſcapes other accidents to which it is ſubject.

Cole-ſeed, he ſays thrives beſt in deep kindly ſoils; but with plenty of manure, and deep ploughing, it will grow any where. He adds, that he has ſeen it yield good crops on a dry chalky ſoil, on which ſtreet dirt had been laid,

We muſt obſerve, that this is a very uſeful piece of knowledge to propagate, as we never yet heard of any farmer in England, who ventured to ſow it on ſuch a ſoil. This ſhould be attended to by the Bedfordſhire farmers about Dunſtable, &c.

Our noble huſbandman next remarks, that in Flanders cole-ſeed is ſown and tranſplanted like cabbages: they give two ploughings to the land before winter; and it is not of much conſequence what crop the land was laſt under.

In the month of May another deep ploughing is given; the land is harrowed two or three times, and then rolled, in order to make it fine. Towards the eighteenth or twenty-fourth of July, it is again ploughed, harrowed, and rolled till it is reduced to as fine a tilth as poſſible: the ſeed is then ſown, being ſcattered by the three fingers: the land is lightly harrowed, and afterwards rolled.

The marquis ſays, that twenty-four pounds of ſeed will ſow three acres, and the plants on theſe three acres will fill twelve others. Cole-ſeed is transplanted after any crop whatever.

The land intended to receive the cole-ſeed plants ſhould be twice ploughed as ſoon as the crop is carried off. About ten or fifteen days afterwards it is to be once or twice harrowed, and towards the end of September it ſhould have a very deep ploughing. In this laſt ploughing there ſhould be an open furrow or trench every five bouts. If the field does not lie level, it ſhould be ploughed obliquely, ſo that there may be an eaſy fall for the water.

The beſt and moſt promiſing plants being taken up, and tied in bunches, are carried to the field where they are to be transplanted, by the time the laſt ploughing is completed, and the workmen are ready for them.

There will always remain a number of plants in the land where they were ſown: theſe are generally fed off with cattle; for the farmers never let them ſtand to ripen their

their ſeeds, unleſs they intend to manure the land for the ſucceeding crop.

The ſeaſon in Flanders for tranſplanting cole-ſeed is the beginning of October. The plants are placed in rows acroſs the furrows. The rows are one foot aſunder, and the plants in the rows about ſix inches diſtance one from the other. The manner in which this work is done is as follows. A certain number of men advance in a parallel line, each having a dibble, or ſpade-handle, with two large iron points to it, ſix inches aſunder: they drive this inſtrument into the ground; the women and children follow, who put a plant into every hole, and ſettle it at the ſame time; which is eaſy enough to do, and it ſaves ſome expence.

When all the cole-ſeed is planted, if the land to which it was removed was not dunged before it was ploughed, it muſt be ſown with pigeons dung reduced to powder: this, of all other manures whatever, has the moſt immediate and proper effect on the vegetation of this plant; ſixty buſhels are enough for two acres.

When this is done, the looſe earth in the trenches, or open furrows, is to be thrown with a ſhovel amongſt the plants in the rows. Early in the ſpring, a ſpit of earth out of the trenches is, in like manner, to be caſt amongſt the plants of cole-ſeed in the rows. This ſlight tillage gives vigour to the crop, choaks the weeds, and keeps the ſoil looſe.

The rows of cole-ſeed form a number of beds, and when it thrives well, the trenches are entirely covered, and the whole reſembles a thick copſe.

Here the marquis obſerves that cole-ſeed thrives perfectly well in new-encloſed lands.

The ſeed is fit to gather about the beginning of July. When it turns yellow, it is reaped like corn, and laid in pretty large gavels on the beds, where it remains three or four days; it is then carried in cloths, in order to prevent any of the ſeed from being loſt, for it is very ready to drop.

In one, or ſeveral parts of the field, in proportion to its extent, and to the quantity of cole-ſeed there is, the crop is formed into ſeveral ſtacks. The Flemiſh farmers never thatch theſe ſtacks; they know ſo well how to make them, that the rain does them no damage. The cole-ſeed heats in the mow, by that means yielding more oil than it would have done, if it had not been ſtacked.

In the month of September they make a kind of floor in the field, whereon they threſh and dreſs their cole-ſeed. If a farmer ſhould incline to threſh his cole-ſeed without ſtacking, it will be neceſſary for him to leave the gavels longer expoſed to the air on the beds. Cole-ſeed may be cut at any time of the day, provided it does not ſhed; if it does, it ſhould only be cut mornings and evenings. As a whole field does not all ripen at the ſame time, it ſhould be cut in different portions; being laid in gavels, or heaps, the changes of weather will not affect it. It may ſafely be ſtacked three or four hours after rain, provided it has previouſly been ſome time in gavels, and is judged ſufficiently dry.

In order to clean the ſeed, parchment ſieves are uſed, if there is any wind ſtirring; but if it be calm, they uſe wind-fans.

Cole-ſeed ſhould not be ſown on the ſame land above once in five or ſix years.

In the neighbourhood of Clermont, in Beauvoiſis, the marquis tells us, that they let the cole-ſeed ripen in the field where it was firſt ſown; but if they conſidered that cole-ſeed is not fond of moiſture, that it ſends forth large roots into the earth, and grows to a great height, with numerous wide extended branches, they would be ſenſible that the land, being covered with too many plants, muſt be impoveriſhed; and that plants, which ſtand ſo cloſe together, cannot attain their full ſize: thus, in this way, the land is impoveriſhed, the weeds are left to perfect and ſhed their ſeeds in it, and not only the crop of cole-ſeed is very indifferent, but alſo the crops which ſucceed it. In order to reſtore ſuch land to a good condition, it ſhould be well manured and fallowed.

Cole-ſeed extracts ſuch a quantity of ſalts from the earth, that the Flemiſh farmers tranſplant it, as well to divide betwixt two pieces of land the loſſes in point of quality it occaſions to the ſoil, as to procure better crops. For both theſe reaſons, they alſo ſometimes tranſplant their cole-ſeed on land newly broke up.

In the country of Amiens they tranſplant their cole-ſeed after the plough in cloſe furrows: this method is better than that above-mentioned; but it is greatly inferior to the Flemiſh method; for the rows are diſordered, and the plants cruſhed by the horſes feet; and having, beſides, no freſh earth laid on them, they cannot grow to ſuch fine plants; and, on the other hand, the earth, which is not kept ſtirring, cannot receive any conſiderable benefit from the influences of the air.

The marquis obſerves, that, there is, however, a caſe in which this method muſt be reſorted to; which is, when the plants are grown ſo tall, and have ſuch long roots, that proper holes cannot well be made for them with a dibble, they ſhould be laid in the furrows after the plough, and open furrows, or trenches, ſhould be left at the diſtances already mentioned; but the earth from theſe trenches is with greater difficulty thrown on the beds, becauſe the cole-ſeed, in this method, is planted lengthwiſe, whereas, in the other method of tranſplanting, the plants croſs the beds.

In this eſſay the marquis de Turbilli relates a very curious fact, which we ſhall inſert in his own words:

"In the year 1755, I ſaw in the neighbourhood of Guiſe, in France, ſome cole-ſeed tranſplanted into a field, containing about eighteen acres, which had always borne fine corn, but had no great depth of ſoil.

"At the depth of ſeven or eight inches from the ſurface lay a bed of red clay, which the farmers are ſo much afraid of mixing with their good earth. This land was firſt well dunged, and when the cole-ſeed was tranſplanted, the red earth out of the trenches was thrown on the beds.

"All the inhabitants of the country flocked to ſee this work executed, which was under the direction of a Flemiſh farmer. They pretended that he ſpoiled the land, and that no corn would grow on it afterwards.

"However, during the courſe of the winter, the red clay became mellow; the rains which waſhed the dung, ran into the trenches, carrying with it a ſediment, and a portion of ſalts, improving the earth that was in the enſuing ſpring to be thrown on the beds amongſt the rows of cole-ſeed, which came on amazingly.

"At the harveſting of the next crop, the inhabitants did not fail of coming to ſee what ſort of corn ſucceeded the cole-ſeed; and being perfectly well convinced that it was much finer than the land was accuſtomed to bear, they laid aſide their prejudices, and adopted the planting

of

of cole-ſeed. In the year 1761, there was in that ſingle quarter above one hundred acres of tranſplanted cole-ſeed."

Muſt we not, on ſuch good authority, allow that the notion of the under-turf earth being poiſonous is ideal? If indiſcreetly laid over the ſurface of the land when it either is, or is to be ſown, under certain crops, it may be prejudicial, and ſo may the beſt practices in huſbandry, if injudiciouſly followed.

A correſpondent of the editors of the Muſeum Ruſticum has given us the following method of cultivating cole-ſeed in Eſſex. He begins with obſerving, that the great conſumption of rape-oil in that country in manufactures, together with the natural richneſs of their land, induces them often to ſow the cole-ſeed or rape-ſeed, which thrives there extremely well.

"In moiſt ſoils, continues he, we ſow it on four-bout lands, the large furrows between the ridges ſerving to drain off the water.

"We do not truſt to the richneſs of our land alone, for we almoſt always lay on a conſiderably quantity of manure; being of opinion that land cannot be in too good heart for this plant, which requires a great deal of nouriſhment, having a very luxuriant growth, and draining the land much: for this reaſon, it is in vain to attempt ſowing it on poor, hungry, dry ſoils, on which it will never thrive, nor turn to profit.

"Land cannot be too mellow, nor too much pulverized, for the cole-ſeed plant; for it not only requires a rich ſoil, but alſo the land muſt be in excellent tilth: we allow land, on which it is to be ſown, ſometimes three or four ploughings, according to the nature of the ſoil: if ſtiff it requires more tillage; if a looſe, rich, crumbly loam, leſs ploughing will do.

"In July we harrow the field over, and afterwards ſow on it half a peck of ſeed to the acre broad-caſt. As ſoon as the plant gets out of its ſeed-leaf, I hoe it as I do my turnips, thinking this a better way than to let it grow rambling without after-culture, as ſome of my neighbours do.

"This crop is, without care, very apt to be deſtroyed by ſlugs, whilſt the leaf is young and tender; but to prevent this, I always ſtrew over the young plants a mixture of ſlaked lime, and wood-aſhes: about ten buſhels of ſlaked lime, and fifteen of the aſhes, will be quite ſufficient for an acre: this is the quantity I uſe.

"I find great benefit from this practice, as it not only burns up the ſlug, and deſtroys many pernicious inſects, but alſo greatly helps to forward the crop, inſomuch that it gets to a ſtrong head before winter, and yields me a plenty of fodder for my cows, ſheep, &c.

"A part of my ground will ſometimes unaccountably fail; that is, the ſeeds will not come up; but as the cole-ſeed plant bears tranſplanting extremely well, I make my men remove ſome of the plants, where they ſtand too thick, to ſupply the deficiencies: theſe are ſure to take, eſpecially if rain enſues: if it does not, I cauſe them to be watered, which is ſoon done, as they ſeldom fail in great quantities.

"The cole-ſeed plant is ſo hardy, that it bears without injury, the froſts of our ſevereſt winters; but the north-eaſterly winds, if very cold and piercing, will ſometimes greatly injure a crop, and there is no guarding againſt theſe.

"We ſometimes in this county ſow cole-ſeed merely for the ſake of the winter feed it affords our cattle; in which caſe we plough it up early in the ſpring, and are almoſt ſure of a good crop of ſound barley. This is not generally practiſed, becauſe it requires great care to clear the land of the cole-ſeed plant, which would otherwiſe grow up with the barley, and injure it; I, however, and ſome others, have often practiſed it to advantage.

"One thing I muſt obſerve before I conclude, which is, that cattle muſt be fed with this plant with great care, or it will have fatal effects: it is beſt to give them with it, at times, ſweet dry hay: this corrects the ſuper-abundant moiſture of the plants, and ſerves to dry up the uncorrected and raw juices that would otherwiſe mix with the maſs of blood in the cattle: ſuckling ewes may feed on it heartily, however, with very little danger: and in fact, experience will ſoon direct the young farmer in the management of his cattle in this reſpect.

"We reap, for the moſt part, our crops of cole-ſeed; and as it is very apt to ſhed, we prepare frames lined with threſhing-cloths, each drawn by one horſe, to receive the heads of the plants as faſt as they are cut off.

"When this crop is properly managed, nothing pays better." *Muſeum Ruſticum vol.* I. *p.* 237.

Another correſpondent of the editors of the above work, gives the following method of cultivating cole-ſeed in the fen countries.

He obſerves, that they make uſe of no muck or compoſt, but have recourſe to the method of burn-baking, which we have already deſcribed under that article. *See* BURN-BAKING.

As ſoon as the land is burnt, and the aſhes ſpread, it is immediately ploughed, and the ſeed is ſown as ſoon as poſſible.

"The quantity we ſow, continues he, on an acre is about half a peck, or rather leſs: it would be proper to draw a light hurdle, ſtuck with thorn ſpray, over it, by way of prevention againſt the fowls. We plough the land about ten paces wide, that the furrows may carry the water off, where the land lies on a little deſcent.

"There is one thing to be obſerved in the ploughing, if the ſquare of the piece will admit of it: you ſhould plough for burning from eaſt to weſt, and when you plough for ſowing, then plough north and ſouth, for theſe reaſons: firſt, the land will break better for being croſs-ploughed; and then the land, when ſown, will lie as it were full face to the ſun; but this cannot always be done.

"As ſoon as the cole-ſeed, begins to ſprout, it is often all deſtroyed with what we call a black fly; an inſect ſo ſmall, and being black, the ſame colour of the land, that it is almoſt impoſſible to ſee it, otherwiſe than as you walk among the ſeed, if you look ſteadily, you will perceive ſomething hop or fly off, like the hopping of a flea: I have often endeavoured to diſcover what ſort of fly this is, but never could find one, though they will find the ſeed immediately on its firſt ſprouting.

"It has many more enemies as it advances in its growth; the next is what we call the black canker; it is a ſmall black worm, about a quarter of an inch long, or rather more: this takes poſſeſſion when it is about the ſize of a ſmall cabbage-plant, but windy and rainy weather are great helps to the deſtroying that inſect.

"There

"There is yet another enemy, but he appears in a different dreſs: this is the green caterpillar, more than an inch long, but does not appear till about the latter end of September, and very often deſtroys a great deal of it; but the froſty mornings generally diſpatch him.

"I have now gone through the various ſteps of the culture of cole-ſeed to this particular period, with a ſuppoſition, that we have eſcaped all thoſe dangers. I will now give you a ſhort ſketch how we proceed when we are attacked with thoſe enemies above-mentioned.

"If the ſmall fly eat the firſt ſprout, it is uſual to ſow the land again: but I would adviſe the farmer, before he ſows, to harrow the land with a light harrow with wooden teeth; for if the harrow be heavy, it will tear up the furrows: my deſign in this is to raiſe a freſh mould, by which means the ſeed will ſtrike much ſooner than if nothing was done to it.

"As to the black canker, the only method I can adviſe is, to let two men take a waggon rope, each take one end, and draw it over the plant about twice in a place, by which means the canker will be beaten off the plant on to the ground, which ſeldom riſes again.

"As to the green caterpillar, the ſame expedient, I believe, would be of ſervice to that; but as I have ſaid before, we are chiefly relieved from it by froſty mornings."

The writer then proceeds to give his readers an account of the uſes the cole-ſeed is put to in the fen countries, when the plant is arrived to its utmoſt perfection.

"We eat off, ſays he, with ſheep that are about half or three parts fat, to make them fit for the butcher; for cole-ſeed is the moſt fattening food for ſheep that is known in this part of the world, greatly exceeding turnips, as a ſheep will thrive more at cole-ſeed in one month, than it will at turnips in two.

"The uſual time of putting them into the feed is about Michaelmas: however that depends upon the farmer's own conveniency; but if the ſheep are poorer than as above deſcribed, they muſt be put in ſooner. We generally manage ſo as to have the ſeed eaten off by about Old Candlemas, for this reaſon; if the land be ſtout and good, there is a chance for the ſeed to ſtand for a crop.

"If the farmer finds the ſeed good enough to ſtand for a crop, I would adviſe him, if the ſtumps or ſtalks be left high, as where the cole-ſeed is ſtrong and good is moſtly three or four inches off the ground; otherwiſe he will find his crop will receive great damage by the ſtumps being left very ſhagged and torn, which lets in the wet, and rots abundance of them; and even thoſe that do grow have not the vigour as thoſe have that are mowed; for the former is, as it were, ſpread to the ſnow and rain, while the latter is wholly ſecured from them both, and will ſupport the ſprouts, that ſhoot out at the ſides with ſtrength and vigour.

"Cole ſeed is a plant that will ſhed or ſhale its ſeed very greatly, if it is not reaped in proper time; from which great loſſes have been known, where the farmer has thoughtleſsly let it ſtand too long before he begins to reap.

"If the ſeaſon has been kind, that the crop comes on all together, though we often ſee the contrary, the farmer is, in either of theſe caſes, as ſoon as he perceives any part of it turn browniſh, to begin to cut, notwithſtanding the generality of the ſeed will be green; but if you let the whole ſtand till the laſt becomes brown, like the firſt, the firſt part will be entirely loſt.

"But it will perhaps be ſaid, ſhould not the latter part be as ripe as the firſt? My reply is, as cole-ſeed is a ſmall ſeed, and the ſtalks on which it grows are very large, the ſtalk will feed that part that is green, after it is reaped, ſo as that of the latter will be nearly equal to the firſt: by which means both are ſaved.

"There is a particular method of laying it on the ground, when reaped, different from all other crops; for inſtance, ſuppoſe the people reaping a field from north to ſouth, every two men ſhould lay in their reaps, with the heads of the ſeed to each other, but not to touch, the heads and the ends of the ſtalk lying eaſt and weſt. We ſhall now proceed to the threſhing.

"The diſtance of time between reaping and threſhing depends ſo entirely upon the weather, that it is impoſſible to give particular directions in that matter, otherwiſe than that when the ſeed has lain till the ſtalk or ſtraw is dead, and turned white, and the ſeed ſome of it being rubbed out of the coſh or pod, appears black and plump, and does readily come out, then is the time to begin to threſh.

"Though the bottom of the reaps will be a little greeniſh, they muſt be not turned to weather the under ſide; if you do, it will bruſh out a great deal of the top ſide: and if the weather ſhould prove wet in the time it is threſhing, even in that caſe it muſt be turned, but raiſed up gently and laid lightly on the ſtubs; in that ſituation they will dry a pace.

"It is always threſhed in the field, upon a cloth, about twenty yards long, and eighteen yards wide. To deſcribe each perſon's employment, I think, it is not to be done, ſo that a perſon that never ſaw it can have an idea of it; but as it is, I think, if every perſon concerned in a cole-ſeed ſale, for that is the name we give the cloth and people when at work, be clever in their places, it is a curious piece of mechaniſm, if I may be allowed this expreſſion, where men and women are made uſe of inſtead of wheels and pullies.

"The number of people employed at a cole-ſeed ſale are, generally, about twenty: ſeven gatherers; theſe are women, great boys and girls: I have ſaid ſeven; but where the crop is thin it requires more, ſometimes eight or ten, or more: but where the crop is thick, a leſs number may do; theſe people gather the reaps up with a ſickle, for, as their arms cannot reach round the reaps, they would ſqueeze it together, and bruſh a deal of ſeed out, if they had no ſickle: they put it into a ſheet called a bearing ſheet, of which there are two belonging to every ſale; is is about ten feet long, and about ſeven feet wide, and has loops on each ſide, through which a light pole is put, and is carried, when filled, by two men to the cloth: theſe are called the bearers.

"When the ſeed is laid on the cloth, there is a man called the layer-on: he with a ſickle lays it on a row, acroſs the cloth, for the threſhers, which are four, two on each ſide of the row of ſeed. While the threſhers are threſhing the firſt row or floor, the layer-on lays on another row at a proper diſtance from the other: when they have threſhed the ſecond once over, they turn to the firſt, and threſh it all a ſecond time: they have then done their parts: there are two men called ſhakers off, that immediately follow the threſhers: the firſt of them throws the cole-ſeed ſtraw up; the other ſtrikes it as it riſes, which helps to knock out what ſeed may be left: theſe two men with wooden forks for that pur-

poſe, convey the ſtraw off the cloth, over the bolſter, to a perſon that takes it away; he is called the ſack-ſtraw.

"After the ſhakers off, come two perſons, one of them a woman: they take off the coſhes or pods, and ſhort broken ſtraws, with rakes made for that purpoſe: theſe are called the before and behind cavers. The behind caver muſt be a perſon of ſtrength and activity, in order to do his work as it ought to be done; for upon him the ſaving and throwing away of a good deal of the ſeed depends; ſo that he ſhould be a nimble briſk fellow, and careful too, or he is by no means fit for that place.

"If there be a good crop, and the plants yield well, the weather bright, and the ſeed threſh eaſy, thirty combs, or one hundred and twenty buſhels, may be threſhed in the day; but ſometimes no more than ten or twelve combs.

"Early the next morning the four threſhers throw the ſeed upon ths cloth, when the farmer comes with ſacks and a waggon, and takes it away, ſo that the cloth is cleared and ready againſt the people come to work." *Muſeum Ruſticum*, *vol.* I. *p.* 418, and *vol.* II. p 79.

If this plant be ſown for the food of cattle, they will be large enough for feeding by the middle of November, when if there be a ſcarcity of other fodder, this may be eat; but if there be not an immediate want of food, it had better be kept as a reſerve for hard weather, or ſpring feed, when there may be a ſcarcity of other green food. If the heads of theſe plants are cut off, they will ſhoot again early in the ſpring, and produce a good ſecond crop in April, which may be either uſed for cattle, or ſuffered to run to ſeed. It is ſo hardy as not to be deſtroyed by froſt, and therefore of great uſe in hard ſevere winters, for feeding of ewes: for when the ground is ſo hard frozen that turnips cannot be taken up, theſe plants may be eat for a conſtant ſupply. Mr. Miller ſays, he has found, in ſeveral places where he has ſowed this ſeed, that one acre of land planted with cole will produce nearly as much food as two acres of turnips; that this will afford late food after the turnips are run to ſeed: and that if the plants are permitted to ſtand for ſeed, one acre will produce as much as, at a moderate computation, will ſell for five pounds; clear of charges.

Partridges, pheaſants, turkeys, and moſt other fowls, are ſo fond of theſe plants, that if there be any of them in the neighbourhood of the field where they are cultivated, they will flock thither, and lie conſtantly among them.

The cakes of cole-ſeed, which remain after the oil is extracted, are exceeding good food for cattle, and will very ſoon fatten them. They are indeed apt to render the fat of ſuch beaſts yellow and rank; but this may be eaſily removed by feeding them with dry fodder a fortnight or three weeks before they are killed.

"Cole-ſeed, ſays Mr. Young, wherever I have remarked the cultivation, has been ſown for a crop of ſeed, as well as food of cattle, but often fed off with ſheep, and afterwards reaped for the ſeed. It is uſually ſown in the manner of turnips; but I never knew any hoed, even by thoſe farmers that are niceſt with the latter crop. It was this circumſtance that firſt induced me to cultivate cole-ſeed; to diſcover if I could gain better crops than common, (for ſheep) by means of a better than common culture.

The ſoil of the firſt experiment, made on half an acre is a looſe woodcock brick earth, and under that a white clay; the field hangs a little to the north. This was ploughed ſix times, and had four harrowings, ſowed broad and twice hand-hoed. The ſeaſon was very unfavourable, being ſo very dry, that almoſt all the turnips in the country were thereby deſtroyed. Half this experiment ground was hand-hoed in the manner as for turnips, the other half had nothing done to it. The whole was fed off by ſheep. The reſult was, a loſs on the part hand-hoed, of 1l. 7s. 7d. per acre; and on the part not hoed of 18s. 3d. per acre.

"This proves ſufficiently the great benefit of hoeing beſides cleaning the land, which is yet more. But I ſhould remark, that the hoeing, if it was a general practice, would be done much cheaper. Labourers always impoſe when their work is uncommon.

Experiment 2d. made upon a field of four acres, hanging to the north, the ſoil a ſtrong clay. This land had ſix ploughings, two harrowings, and two water-furrowings; was ſown broad caſt, July 1ſt. and the ſeed harrowed in. The exceſſive drought prevented the crop from riſing as it ought to have done, but yet the plants were more numerous than in ſome turnip fields adjoining. I was induced therefore, as the land had been well prepared, to let it ſtand.—January 24th, I turned into it fifty ſheep, and three two year old heifers; it kept them juſt three weeks. The keeping of the ſheep being reckoned at 4d. per week, and of the young cattle at 1 s. 3 d. per week, the value of the produce was 3 l. 1 s. 3 d. but the expence computed there was a loſs upon this crop 1 l. 5 s. 7 d. $\frac{3}{4}$ per acre.

"The greatneſs of this loſs is certainly much owing to the dryneſs of the ſeaſon; but ſuch miſchances are never to occaſion a neglect of trials, that are ſubject to them: all vegetables are liable to ſuch evils, and if one ſpecies withſtands the enemy better, upon the average of a long period, than another, it is an advantage that ought by no means to be over-looked: experiments regiſtered only in favourable years, are uſeleſs becauſe unfair.

"The ſheep and young cattle both affected this food much; but the latter not ſo ſoon as the ſheep.

Experiment 3 d. Half an acre in two diviſions, 1776. —The ſoil and expoſure the ſame as in the laſt experiment.—Firſt diviſion, one rood, five ploughings, three harrowings; ſown broad caſt the ſecond week in June.—The plants extremely favourable—July 9th, hand hoed the firſt time; and again the 24th. The effect of theſe hoeings was ſtriking—The other rood ſowed at the ſame time, broad caſt, and not hoed.—September 9th, viewed this experiment; the hoed part is as thick as the other, and much more luxuriant, but very few weeds; the other full of them.

March 17th, hurdled the diviſions, and fed them off with 60 ſheep, the unhoed half laſted them ſix days. They were turned into the other, which kept them juſt eight days. N. B. They were taken out of nights, and lodged in a ſmall paſture near the field.

	l.	s.	d.
The profit of the rood hoed, after deducting all expences	1	19	5
Ditto, of the rood unhoed ditto	1	9	11
——Superiority of the hoed per acre	0	9	6

The

The ſheep are very fond of this crop, which agrees perfectly well with them, and the young lambs throve very much.

Experiment 4th. Half an acre in four diviſions, 1766. This piece in the ſame field as the laſt experiment. The ſoil and expoſure the ſame.

Ploughed the whole ſix times, and harrowed three times, the laſt ploughing the 27th of June, and by this ploughing ſtruck it into four parts, and ſowed,

No. 1. Harrowed in the ſeed for broad caſt, for the common management.

2. Harrowed in the ſeed broad caſt, deſigned for hand-hoeing.

3. Thrown on to 5 feet ridges, and drilled, a double row, one foot aſunder each.

4. Left flat, and drilled in equally diſtant rows, two feet aſunder.

July 15th, hand-hoed No. 2, 3, 4, and hand-hoed the ſame again, Auguſt 6th,—July 21ſt, horſe-hoed No. 3, by turning a furrow from the plants. The 23d, hand-hoed it again, ſetting the plants out eighteen inches from each other in the rows. Auguſt the 12th, horſe-hoed No. 3 again, throwing the mould to the plants. The 22d, another horſe-hoeing, reverſing the laſt. September 2d, another, throwing the earth back to the plants.

The end of March, I moved No. 1 firſt, and ſpread the crop upon a piece of dry graſs ground, and then turned 15 hogs, about three parts grown, into the field. They took at once to the cole-ſeed, and fed very heartily upon it. They were kept to it, and it laſted them juſt three days.

No. 2. laſted them ſeven days
No. 3. laſted them two days.
No. 4. laſted them five days.

The hogs throve very well on this food, and none of it was waſted.

The expences of theſe products beings deducted, it appears that they were all unprofitable, in the proportions following

	l.	s.	d.
No. 1. The broad caſt unhoed, loſs per acre	1	12	8
2. The broad caſt hoed ditto	1	5	10
3. The horſe-hoed ditto	2	11	8
4. The drilled in equidiſtant rows, ditto	1	14	2

From this view the comparative advantages (or rather diſadvantages) are pretty clearly ſeen.

The ill ſucceſs of this experiment, is to be attributed to more cauſes than one. The poverty of the crops in point of quantity; and the vegetable not being of that ſubſtantial nature which goes far in feeding of the cattle. And yet I think three pence a week (the price charged in the eſtimate) a fair price for hogs, that riſe, when full grown, to about ten ſtone (14lb.)—From viewing the field, I ſhould have thought the hoed broad caſt crop would have turned out better; but it never carried near ſo good an appearance as experiment No. 3. But whatever idea is formed of cole-ſeed in general from this trial, the comparative part of it is very deciſive. Drilling is evidently an improper method o cultivate it; and horſe-hoeing exceſſively unprofitable, the expences being very great, and far worſe than no purpoſe. The beauty and luxuriance of the plants in theſe rows were great, but the ſuperior quality of the others, much more than balanced this circumſtance."

We may remark upon theſe four experiments, that computing the quantity of the crops from the number of cattle fed upon each, is not ſo accurate and ſatisfactory, as by weighing the produce of each; and the reaſon of the drilled equidiſtant rows, falling ſhort of the broad caſt hoed, would have been more apparent, had the diſtance of the plants in theſe rows been mentioned. It would ſeem that the plants ſtood too thin in the rows: for it is certain, from repeated experiments made upon wheat, and other plants of a leſſer growth than cole-ſeed, that drilling them in rows, at two feet aſunder, conſtantly improves the crops beyond the broad caſt ſowing, provided the drilled plants are properly hand-hoed.

The very ſmall produce of the horſe-hoed crop, is ſtill more extraordinary, as it is allowed by all experienced cultivators, that horſe-hoeing improves plants of every kind more than any method of culture hitherto known: for which reaſon they are allowed more room than in any other way. There is however a medium to be obſerved; they may be planted too thin for profit, even for horſe-hoeing, which ſeems to have been the caſe here. For theſe horſe-hoed plants, were upon five feet ridges, two rows upon each ridge, at a foot diſtance, and the plants were ſet out to the diſtance of eighteen inches plant from plant in the rows. By this diſpoſition, every plant occupied a ſpace of a foot and a half ſquare; a ſpace not indeed too great for theſe plants, where the land is good and well horſe-hoed; as appears from an experiment made by Mr. Donnellan near Dublin, related in a letter from him to Mr. Wynne Baker, November 8, 1765.

"In a very hard winter, ſays Mr. Donellan, I obſerved in my garden, a plant in full verdure above the ſnow, when turnips were buried a good depth below it. On enquiry I found it was rape (I believe the Engliſh call it cole) I tried cows and ſheep with it, and found they devoured it with greater eagerneſs than I had ever ſeen them eat any other ſoil. This determined me to try it, and it has anſwered beyond my expectations, for cows and ſheep, eſpecially ewes.

"I have cultivated it ever ſince, as the beſt plant for winter and ſpring paſture, that had at that time come to my knowledge.

I ſow the ſeed about the beginning of July, on good garden ground in drills, and tranſplant it upon ridges, thrown up from a good fallow, at three feet diſtance the rows, and the plants in the rows about eight inches diſtance (which I believe is too near) in Auguſt, to chuſe, when the ground is moiſt with rain. If it has a favourable ſeaſon, about Chriſtmas it will be about two feet high; but in March, when the ſeed branches have ſhot, near four feet high.

"I weighed a middling plant in March, 1753, it weighed eight pounds. In 1754, a midling plant weighed ten pounds.

"My butter from the time the cows began to get the rape, was of a rich yellow colour, and had a particular ſweetneſs. And the ewes and lambs were in high order. —It muſt be given to cows with caution, as it will hove them like clover, if given in too great quantities.

"A man will plant eight yards of a ridge in ſeven minutes. This is all I can recollect in relation to this valuable plant, which for quality, quantity, and laſting, excels all that I have experienced or obſerved."

Computing from the ſmalleſt of the plants that Mr. Donellan weighed, eight pounds, his crop was 73 tons,

and 600 weight, upon an Engliſh acre, which is without doubt a great crop. Mr. Donellan does not mention in what manner he cultivated theſe plants, but it ſeems by the diſpoſition of the plants, and his culture of other crops, which he does mention, that theſe were horſe-hoed. His method of planting adapted them better for the horſe-hoeing culture, than in the above experiments where two rows were planted upon five feet ridges; ſingle rows being always more improved by horſe-hoeing than double rows, of plants that grow large enough to admit of that manner of planting. We ſhall next proceed to Mr. Young's laſt experiment upon this plant, the products of which were weighed.

"Experiment No. 5. Upon half an acre in three diviſions, 1767. The ſoil, expoſure, &c. the ſame as in the preceding experiment.

"This piece had ſeven ploughings, and five harrowings, ſtruck into three parts, and ſowed them the 29th of May, viz.

No. 1. With cole-ſeed broad caſt.

No. 2. With turnips broad caſt.

No. 3. Was planted with cabbages, the Batterſea ſort, in rows four feet aſunder, and three feet in the rows, the plants of which had been raiſed in the garden.

"June 15th all three were hand-hoed. The 27th, horſe-hoed the cabbages, and hand-hoed the turnips, and cole-ſeed again. July 18, the ſecond horſe-hoeing, the 28th, the third. Auguſt 4th, hand-hoed them again. The 6th, the fourth horſe-hoeing. All three crops flouriſhed exceedingly. October 5th, cut them all; and weighed the produce.

	Tons	Cwt.	lb.
No. 1. weighed 17 cwt. or per acre	5	0	0
No. 2. weighed 3 tons, 13 cwt. or per acre	21	18	0
No. 3. weighed 4 tons, 13 cwt.	27	18	0

"They were then given, upon a bare graſs field, to two large oxen, and two dry cows.

	l.	s.	d.
No. 1. Laſted them two days, which, at 5 ſhillings a week for the two oxen, and 3 s. 6 d. for the two cows, comes to 2 s. 6 d. or per acre		15	0
No. 2. Laſted them a week, which, at the above prices, comes to 8 s. 6 d. or per acre	2	11	0
No. 3. Laſted them juſt a week and a half, which at the above prices, comes to 1 l. 1 s. 3 d. or per acre	6	7	6

From a compariſon of theſe products, with the ſtated expences of raiſing them, there appears to be on

No. 1. A loſs of 2 l. 3 s. 9 d. per acre, and on

No. 2. A loſs of 10 s. 9 d. per acre.

No. 3. A profit of 2 l 5 s. per acre.

"Cole-ſeed makes a very indifferent appearance here. The cabbages did not near equal ſome other crops I have had at various times, but they are much ſuperior to the other vegetables.—All three crops would have improved, had they ſtood longer (although they were ſown very early) but the compariſon remains the ſame. The cabbages, however, would have decayed ſooner than either of the others.

"*Corollaries to be drawn from theſe Experiments.*

1. Cole-ſeed is a nouriſhing and wholeſome food for oxen, cows, ſheep, and hogs.

2. The quantity of its produce, under the preceding management, is inconſiderable, and not upon an average ſufficient to anſwer the expences of culture.

3. The beſt culture is that of ſowing broad caſt and hand-hoeing, as in the turnip huſbandry: without hoeing it is much worſe, and drilled and horſe-hoed naught.

4. Turnips are much ſuperior in quantity and value of produce.

5. Cabbages are greatly ſuperior to it."

Cole-ſeed, as Mr. Young juſtly remarks, makes a very indifferent appearance here; and it ſeems indeed extraordinary, that a plant, which will riſe to the weight of eight or ten pounds, ſhould produce no more, by what he reckons the beſt culture for it, ſown broad caſt and hand-hoed, than 5 tons upon an acre: yet at one plant only, weighing ten pounds, upon a yard ſquare, the produce of an acre amounts to 21 tons, 12 cwt. We have ſeen that Mr. Donellan's was much greater than this; and if we ſhould ſuppoſe that he made a miſtake, and that the plants he weighed were larger than the average of his plants, it is not probable that they were twice the weight of the average: yet even upon that ſuppoſition, his crop was above 30 tons per acre, and Mr. Young's beſt crops but 5 tons per acre: a very ſurpriſing and unaccountable difference, eſpecially when we conſider that the crops were both of them weighed at the ſame period of their growth, both in the month of March.

This eſſay on the culture of cole-ſeed is concluded with the following remarks:

"Cole-ſeed is one of the moſt profitable common crops known in England; but not for feeding cattle; nor ſhould I have conceived that any perſons could have thought of comparing it with turnips in that light. The profit of the crop is the ſeed, which amounts to five times the value of any food for cattle that will ever be gained from it.

"I have made enquiries in many parts of the kingdom concerning the culture, and I find that the great object is every where the ſeed; that in moſt parts they have no idea of feeding it at all; and that in others, where it is practiſed, they do it merely upon the ſame principle that wheat crops are fed off. The farmers are diſtreſſed for green food, and they turn their flocks into their wheat and cole-ſeed, (in many places abſolutely againſt their own judgment, relative to the crop alone) not becauſe ſuch crops were ſown for the purpoſe, but their yielding food when the flock ſtarves.

"Some very ſenſible farmers, long practiſed in the culture of cole-ſeed, with whom I have converſed on the ſubject, have aſſured me, that if it is fed when the food is wanted, that is after turnips are done, the crop of ſeed is vaſtly damaged by it, to a much greater amount than the value of the ſheep fed.

"Some of them have told me, that they have fed off crops earlier, and they think the ſeed not the worſe: but this they mention as a doubt.

"But if the plant be applied to the ſame uſe as turnips, and uſed at the ſame time, it is agreed throughout the kingdom, that the culture is worthleſs, not producing near the quantity of food with that crop, nor paying in any reſpect ſo well.

"Reſpect-

« Reſpecting the culture of cole-ſeed merely for food, in April and May, that is to ſucceed turnips, there is one ſtrong reaſon againſt it, which is, its not producing a great weight of food per acre. I know, both from my own and other's experience, that the weight of food is trivial, compared to that of turnips and cabbages, &c. I will venture to ſay not an eighth part, conſequently much land muſt be appropriated to this uſe, and after the ſeaſon in queſtion, what quantity of barley or oats will be gained?—The ſowing will be in May, now it matters nothing to enquire into culture, or any other circumſtances; it is clear enough that the ſpring corn crop is ruined by late ſowing.——Hence ariſes the neceſſity of the ſpring food yielding a great quantity on a ſmall ſpace of land, that the farmer may experience this evil only in a ſmall degree. Cabbages, which yield as much food on one acre, as ever cole-ſeed will on ſix, appear to come infinitely nearer the wiſhed for mark." *Young's Eſſay on the Culture of Cole-ſeed, including Experiments.*

Cole-*Cale*, or *Keal*, ſignifies pottage in the northern parts of England and Scotland.

COLEWORT, or *Dorſetſhire Kale*, is a ſpecies of cabbage, formerly much cultivated in gardens, but at preſent little known, cabbage plants being ſubſtituted in its room. It is however a very uſeful plant for feeding milch-cattle in the ſpring, when there is a ſcarcity of herbage; for it is ſo hardy that no froſt will kill it.

The beſt method of cultivating this plant in the fields is, to ſow the ſeeds about the beginning of July, chooſing a moiſt ſeaſon, which will bring up the plants in about ten or fourteen days: the quantity of ſeed for an acre of land is nine pounds. When the plants have got five or ſix leaves, they ſhould be hoed in the ſame manner as turnips, cutting down all the weeds from among the plants, and alſo thinning the plants where they are too thick; but they ſhould be kept thicker than turnips, becauſe they are in more danger of being deſtroyed by the fly: this work ſhould be performod in dry weather, that the weeds may be killed. About ſix weeks after the plants ſhould have a ſecond hoeing, which, if carefully performed in dry weather, will entirely deſtroy the weeds, and make the ground clean, ſo that they will require no farther culture. In the ſpring they may either be drawn up, and carried out to feed the cattle, or the beaſts may be turned into the field to feed upon them as they ſtand; but the former method ſhould be preferred, becauſe there will then be little waſte; whereas, when the cattle are turned in among the plants, they will tread down and deſtroy more than they eat, eſpecially if they are not fenced off by hurdles. *Miller's Gard. Dict.*

COLLAR, the part of the harneſs that goes round a horſe's neck.

Collar *of Brawn*, is the quantity of brawn bound up in one parcel.

COLLATERAL *Bee-Boxes*. *See the article* Bee.

COLLEY *Sheep*, ſuch ſheep as have black faces and legs. The wool of theſe ſheep is very harſh, with hairs, and not ſo white as that of other ſheep.

COLLIFLOWER. *See the article* Cauliflower.

COLONY, a number of people drawn from the mother country, to inhabit a diſtant place. And hence the ingenious Mr. White has applied the word to a ſtock of bees. *See* Bee.

COLT, a foal, or young horſe.

Foals are ſeparated from their dams after five, ſix, or at fartheſt ſeven months; experience having ſhewn, that ſuch as are ſuffered to ſuck ten or eleven months, though uſually larger and fuller of fleſh, are not equal, in other reſpects, to thoſe that are taken away ſooner. After living ſix or ſeven months on milk, they are habituated to a more ſolid nouriſhment, having bran given them twice a day, with a ſmall quantity of hay, which is increaſed as they advance in age, and in this manner they are kept in the ſtable, as long as they expreſs any deſire of returning to their dams; but when this uneaſineſs is over, they are turned into the fields, taking care never to do it faſting. An hour before they are turned to graſs, a feed of bran and ſome water ſhould be given them; nor ſhould they be expoſed to either ſevere cold or rain: in this manner the firſt winter muſt be paſſed. In May following they muſt not only be turned into the fields every day, but may lie in the open air till the end of October, taking care not to let them feed on the after-math; for by accuſtoming themſelves to this remarkably delicate and ſucculent graſs, they would contract a diſlike to hay, which, together with bran mixed with barley and oats ground, ſhould be their principal food during the ſecond winter. In this manner they are to be kept till their fourth year, ſpending the days only in the paſtures, during the winter; but both day and night in the ſummer. When they reach that age, they are to be taken from the paſtures, and fed with dry meat; but in this change of food ſome precautions are requiſite; as during the firſt week to feed them only with ſtraw, and give them proper medicines againſt worms, which often trouble them from bad digeſtions and too rank graſs.

At weaning young colts, they ſhould be kept in a clean ſtable, not over warm, which would render them tender, and too ſenſible of the impreſſions of the air. They muſt frequently have freſh litter, and be rubbed often with ſtraw; but not tied or curried till they are three, or at leaſt two years and a half old; for the roughneſs of this friction would give them pain, and their ſkin being too tender to endure it, inſtead of thriving, they would fall away. The rack and manger ſhould not be too high, leſt the neceſſity of liſting up their heads to reach their food ſhould occaſion them to carry their heads in that manner, which would ſpoil their cheſts. When they are a year, or a year and a half old, the hair on their tails ſhould be cut, as the ſucceeding growth will be ſtronger and thicker than the former. When they are two years old, they ſhould be ſeparated, and the ſtone colts kept with the horſes, and the fillies with the mares, otherwiſe the former would fruitleſsly weaken themſelves with the latter. At the age of three years, or three and a half, they ſhould be broke, and rendered docile. In order to this, a light eaſy ſaddle ſhould be put on their backs, and continue there three or four hours every day. They ſhould alſo be uſed to receive the bit of a ſmall bridle into their mouths, and ſuffer their feet to be taken up, and ſome ſtrokes given on the ſole, as if ſhoeing them. If they are deſigned for draught horſes, a harneſs ſhould be put on their bodies, and afterwards a ſnaffle bridle ſhould be added. They ſhould then be trotted on level ground, but without a rider, the perſon only holding the reins, and either the ſaddle or harneſs on their backs: and when the ſaddle-horſe eaſily turns, and freely comes up to him that holds the rein, he ſhould mount on his back, and

and dismount again immediately, without riding him, till he is four years old, as before that time the weight would be too much for him: but at four years old he may be ridden, and trotted at small intervals. *Buffon's Histoire Naturelle, tom* IV.

COLT-EVIL, a distemper to which young horses are subject, consisting of a swelling in the sheath, occasioned by their having full liberty with the mares before they are able to cover them.

This disease may be easily removed at the beginning, by the use of warm fomentations, made of emollient herbs, &c. but if the swelling be hard and inflamed, bleeding and purging are both necessary; and it may also be proper to tie his yard up to his belly, making a hole for his water to pass free. *Gibson's Farriery, vol.* II. *page* 168.

COLTS-FOOT, *fole-foot, horse-hoof,* or *bull-foot,* the name of a very common weed, whose scaly stalks arise in February, bearing one yellow compound flower, which is succeeded by a hairy white down. The leaves come out later. They are shaped somewhat like a horse's hoof, and are downy underneath.

This weed, which delights to grow by the side of rivers, increases so fast by its seeds and rambling roots, every piece of which last will produce a new plant, though they have been broken by the plough, that it cannot be extirpated without much difficulty, and a considerable time. Carefully pulling up the roots every time the earth is stirred, or the least vestige of the plant appears, and preventing its running to seed, are the most effectual means of destroying it in arable land: and this is best accomplished by the horse-hoeing husbandry: but totally to extirpate it, the ground must be laid down long to grass. One of Mr. Lisle's neighbours almost destroyed it by two successive crops of vetches; and he himself is clearly of opinion, that may be killed by letting the land lie a sufficient time under clover or rye grass; because, says he, the roots of the natural grass matting more and more every year, will in five or six years, so bind the surface of the ground, that the colts-foot will not be able to pierce through it, and will therefore die for want of air. He ploughed up broad clover in the beginning of July, and turned up the roots of colts-foot, in which he observed, between earth and air many little buds, shot forth, of the bigness of the mid-summer buds in fruit-trees, probably to be the leaves or flowers of the next year; and at the depth of five, six, and even seven inches, he remarked here and there a shoot of a callous body, like the root itself, from one to four inches long; perhaps destined to be future roots: he experienced that a winter's fallow will not destroy these roots, and that they cannot resist the effect of summer fallows, in which they are turned up, and exposed dry to the sun. It is therefore necessary to pick them as clean as possible, and burn them: for it is not to be supposed, that all the roots which are turned up in a summer fallow will wither of themselves: on the contrary, such of the buds at the joints of these as are buried under ground, will shoot out again if much rain falls, or the season be wet.

COMB, a measure of corn, consisting of four Winchester bushels; but in the fen country the comb generally consists of four bushels, and each bushel of eight gallons and a quart.

COMMON, an open piece of ground used equally by many persons,

The marquis of Turbilli has treated the subject o breaking up commons and waste grounds in so masterl a manner, that it will be necessary to give the substanc of what he has advanced on this interesting subject, nearly in his own words.

"Upon the death of my father, says the marquis, which happened in the year 1737, I inherited the lands of Anjou, of which I am now going to speak. They lie contiguous, and form a pretty considerable extent.

"Hills and vales render the country uneven in many places; though in others, there are spacious plains, with several brooks, and a small river. The soil is of three kinds, bad, middling, and good: but this last is least frequent. Most of the lands being of a middling quality, are fertilized only by dint of care and manure: wheat grows on one spot, meslin on another, rye on a third; and sometimes it is necessary to sow these three different sorts of grain in the same field; so much does the soil vary: but, in general, we sow more ground with rye, than with any other corn. Buck-wheat, barley, oats, hemp, flax, and other equally useful productions, are likewise cultivated in these parts. The vine prospers here very well, especially on the sunny side of banks and higher grounds: our wine, both red and white, is good; our fruit trees thrive well; and so does the white mulberry, of which I made large plantations some years ago. The oak, the elm, the beech, and other forest trees, grow extremely well in these lands. Such is the soil of this district: the climate is mild and temperate, as is the rest of Anjou.

"Three sides of this estate border upon immense tracts of uncultivated heaths, which spread through the greatest part of the province, and belong, some of them to the king, and others to different lords, ecclesiastical and temporal. However, the situation of my house, and of the chief village, is advantageous, being nearly in the center of the whole, and within about six miles of three pretty towns.

"Such was my estate when I took possession of it: not a quarter part of the land was cultivated, and even that very badly: the rest was either abandoned by the husbandmen, or had not been cultivated at all. Most of the meadows along the brooks and rivulets were become marshes, productive of scarce any thing but rushes. The vineyards were ruined, and the woods destroyed. A third part of the farms belonging to the principal parish where my seat is, were un-tenanted, for want of farmers to rent them. The inhabitants of this place were very poor, and did not, in general, raise corn enough of any kind to subsist them half the year: nay, such was their indolence, that they chose rather to stroll about and beg during the other half, than be at the pains of bestowing proper culture upon their land, which, with that culture, would have maintained them decently.

"This deplorable condition of my estate, which I have here represented fairly, without exaggerating any one particular, determined me, early in life, to read attentively all the most approved writers upon agriculture, and to observe carefully every improvement I met with in my travels. Even the campaigns in which I served did not interrupt these inquiries; for agriculture and arms never were by any means incompatible. Under these circumstances, I resolved to execute upon my own property,

perty, deſigns, which my knowledge of the place, concern for the unhappy ſituation of its inhabitants, and regret to ſee what ſmall returns were made by ſo large an extent of ground, naturally ſuggeſted.

"I plainly foreſaw that this undertaking muſt be a work of time; neither my fortune, nor the number of hands I could procure in the country, allowing me to go beyond the clearing and improving of a certain ſpace every year. Some gentlemen of knowledge, judgment, and public ſpirit, to whom I communicated my thoughts, approved of them, commended my deſign, and exhorted me ſtrongly to carry it into execution; repreſenting, beſides the advantages which would neceſſarily accrue to me, the general benefit which ſuch an example might be of to my country, filled as it is with numerous tracts of uncultivated land. This laſt reflection animated me more and more.

My firſt care was, to endeavour to extirpate the ſpirit of indolence, and conſequent love of begging, which prevailed among my peaſants in general. To this end, I gave public notice of my intended improvements, with a declaration, that I would conſtantly employ every man, woman, or child above eight years of age, who might not have buſineſs of their own to do, on condition of their leaving off begging. At the ſame time I ordered an account to be taken of ſuch as were not able to work. Theſe I afterwards examined more particularly myſelf, and found among them ſeveral who, though they were not fit for hard labour, were capable of doing many uſeful things, in which I accordingly employed them. By this means, my liſt of really helpleſs people was reduced to a ſmall number, which I provided for, till their relations ſhould be able to keep them by means of what they earned from me. A few, and only a few, of theſe poor objects, who either had no relations, or ſuch as in truth could not help them, became a dead charge; though this ſoon leſſened, and is now inconſiderable.

"An innumerable multitude of rabbits infeſted my land. Againſt theſe I declared open war; being determined abſolutely to deſtroy them. This has already been ſeveral years a-doing, and is not yet entirely completed. Some of them ſtill remain, ſheltered in their burrows at the foot of riſing grounds, and others make incurſions from the neighbouring woods and warrens. However, they do me no great miſchief now; and even then I drove them from the place where I wanted to work.

"In the month of June 1737, I begun my improvements with clearing ſome of the land near my houſe. This ground was ſo poor that no farmer would even attempt to make any thing of it, ſerved only to feed a few ſtinted cows, and was over-run with briars, thiſtles, and broom, which, being cut up, and laid in heaps, from ſpace to ſpace, were burnt upon the ſpot, and yielded a conſiderable quantity of aſhes. Theſe were then ſpread, and immediately turned in by a ſingle plowing, leſt their virtue ſhould exhale. During the ſummer, this land was ploughed ſeveral times, different ways, in order to looſen it, and endeavour to deſtroy the weeds. I had bought for this purpoſe oxen, which are generally uſed for ploughing in Anjou: but my horſes helped them, eſpecially for harrowing. Here my poor peaſants, men, women, and children, were employed to break the clods and pick off the ſtones; and as I had more dung than my arable lands required, I ordered about half the quantity that is generally uſed in other places, to be laid upon this ground, which was afterwards ſowed at the uſual time. This firſt trial ſucceeded, and the crop was very good; though moſt of my neighbours were of opinion that all my labour would be loſt.

"In 1738, I undertook another piece of ground, adjoining to the former, and of the ſame kind. I began in March, proceeded as before, dunged it, and had equal ſucceſs. The ſecond crop of the former ſpot was ſtill more plentiful. This ſummer I gave a thorough fallow to ten acres which had long been under corn, and ſowed part of them with hemp and flax, for a purpoſe which will be mentioned hereafter. I likewiſe recruited my vineyard, and drained my meadows. Numbers of day-labourers were employed in cleanſing the rivulets and brooks which run through them. In the winter of this year an accident happened, which had like to have overſet my whole undertaking. The oxen which I uſed for ploughing, and which were grown lean, it was ſuppoſed through labour and fatigue, were on a ſudden covered with vermin, which eat into their fleſh: ſeveral remedies were applied, but in vain, the vermin re-appearing in a few days. We knew not to what cauſe to aſcribe this diſorder, which was deſtroying animals without whoſe aſſiſtance I could not proceed: beſides which, the loſs would, in itſelf, have been conſiderable. They had hitherto been fed with hay only; though the cuſtom of the country was to mix it with an equal quantity of wheat-ſtraw. As I had not yet a ſufficiency of this laſt, I bought ſome, gave it to them mixed with hay, and allowed them oats from time to time when they had been hard worked. This mended them a little: but they did not recover entirely, or get rid of their vermin, till they fed on green graſs, and lay out of doors.

"I begun this year to make new roads and cauſeys acroſs my meadows, marſhes, and riſing grounds, for the eaſier conveyance to and from my fields; the old ways being often impaſſable in many places. This has been a very long and expenſive work; nor is it yet quite finiſhed. I alſo bought at this time a number of ſheep, which have ſince increaſed conſiderably; for, notwithſtanding the great extent of this uncultivated land, where many of them might eaſily have been fed, none were ever kept upon it before. The people of the country thought they could not thrive there, on account of the maſhes, and of a plant called white root, very prejudicial to them, found in ſeveral parts of the lay-grounds and commons. Moſt of theſe weeds were pulled up at a ſmall expence; and the ſheep, who were fond of this herb, eat up the reſt, which was ſo little that it could not do them much hurt, though ſome of them were ſick with it. The conſtant feeding of the ſheep, and their dung, afterwards completed the deſtruction of this noxious plant, and brought up good graſs in its ſtead. This ſhews how farmers may often get rid of any ſuch bad weed.

"In 1739 I took the next contiguous land, going round my manſion: a method which I have always followed; ſo that my improvements have been, from year to year, more and more diſtant from my place of reſidence. The ſoil I now fell upon was tough, ſtrong, and only thin graſs grew upon it, with here and there a few brambles and other wild productions, which were ſoon cut up. This ground was broken up only with the plough: ſome dung was laid upon it, and I ſowed

it

it directly with winter oats, which ſuccee led very well. My improvements of the two laſt years yielded plentiful crops, not only of corn, but alſo of hemp and flax. Theſe laſt were dreſſed and given to the women and girls to ſpin; paying them different prices, according to the fineneſs of the thread. They applied themſelves to their work, and by degrees became perfect in it. By this means I accompliſhed my deſign of finding employment for theſe women and girls all the year round, and afforded them the means of procuring an honeſt livelihood, as well as to thoſe whom age or infirmities rendered incapable of working abroad.

"The buſineſs of the field was always preferred in the ſeaſons proper for it, and when the weather permitted; keeping in my eye Cato's advice, never to work within doors, while there is any thing to be done without, nor to do that in fair weather, which may be done in wet. I have continued this ſpinning ever ſince; and have allotted for the growth of hemp and flax particular ſpots, which I have incloſed with hedges and ditches, and kept in good heart and with fine tilth. They have yielded plentiful annual crops without being reſted; only dunging them every other year; for hemp does not impoveriſh the ground when it is properly cultivated. My vines, meadows, and ways were not neglected.

"In the beginning of this winter I gave my oxen hay mixed with an equal quantity of rye-ſtraw, not having wheat-ſtraw enough to anſwer that purpoſe. This ſucceeded to my wiſh. My oxen continued in perfect health, free from the vermin I mentioned before, and in better plight than thoſe in the neighbourhood, which were fed with hay and wheat-ſtraw. I have continued to give them this food as long as they lie within doors, and find it anſwer extremely well. During this time they have no corn, even though they work; and I do not find that this ſuppreſſing of their otherwiſe uſual allowance of oats, renders them at all leſs hearty and vigorous. This quality of the rye-ſtraw may be of great advantage in countries where oxen are uſed for ploughing.

"In the year 1740, I was obliged to make a conſiderable addition to my number of ſervants, and ſtock of cattle of all ſorts, in proportion to the increaſed extent of my improvements. It may perhaps be thought, that ſo many ſervants would eat me out of houſe and home. This I had guarded againſt from the beginning. All thoſe employed in my huſbandry lived by themſelves, in ſome of the out-houſes, where they had their own kitchen, and a certain ſtated allowance, ſuited to their uſual manner of life; ſo that they had no ſort of connection with the others, whoſe more immediate buſineſs it was to attend me.

"The land which I improved this year was covered with heath, broom, and furze, which had grown very thick and high. In the ſpring, when the weather was dry, I ſet fire to this ſurface, after taking due precautions to hinder the flames from ſpreading too far. The whole burnt very well, and I was in hopes of being able to plough up this ground without paring off the turf, as I had done with my other land the year before. This would have been a conſiderable ſaving; eſpecially as the aſhes were ready ſpread. But I ſhould have conſidered that different lands require different treatment. Ploughs, ſtronger than uſual, were made on purpoſe for this work; but the roots of the furze and broom, which had reſiſted the fire, broke them; and though I doubled the number of my cattle for draught, ſeveral of the oxen were ruined by this hard work, in which I perſiſted with too much obſtinacy. In vain did I plough it over and over, and break every clod both before and after ſowing it; the broom and furze were not deſtroyed, but made new ſhoots every where: the land continued unkindly and ſour, and the oats which I ſowed in it yielded ſcarce any crop; in ſhort, repeated ploughings and dunging were neceſſary during three years, before it could be brought to a good tilth, or thoſe noxious plants be quite extirpated. I came badly off in this experiment: but my former improvements, which I had continued to manure and ſow, luckily produced an abundant crop: that of the laſt year yielded a good quantity of wheat, which kept up my eſtabliſhment, though it did not compenſate for the loſs I now ſuſtained. However, this diſappointment did not diſcourage me. It raiſed the laugh of the whole country at my expence; eſpecially of thoſe who had foretold from the beginning, that I ſhould not ſucceed. I gave them the hearing, and only reſolved not to fall a ſecond time into the ſame error.

"This year I eſtabliſhed a nurſery of fruit-trees, and alſo of foreſt trees from other countries. This nurſery which ſucceeded very well, was of great advantage to me afterwards, to fill up the different plantations which I made as my improvements extended. I likewiſe repaired my woods, which had formerly been deſtroyed by cattle and deer. I ſurrounded them with ditches planted with hedges, in order to bring them into regular yearly cuttings; to which end I grubbed up ſuch trees as were ſtinted in their growth, and filled every empty ſpace, either with young plants, or the ſeeds of others, according to the nature of the ground. By continuing to do this every year, my woods are now in excellent order, and afford regular cuttings, at the ſmall expence of keeping the fences in repair.

"In 1741, I had the ſame kind of land to deal with as the year before; but took care not to commit the ſame fault. Each day's cutting of the heath, broom, &c. was burnt, with proper precautions, as the workmen advanced, and the whole ſurface was dug by hand as it was cleared. By this means, the aſhes of theſe plants preſerved their fertilizing quality, and their roots were pulled up. Women and children ſhook the earth from off theſe roots, and turned them, whilſt they were drying in the hot weather. Theſe were alſo laid in heaps from ſpace to ſpace, and burnt upon the ſpot, where they yielded ſome aſhes, which were ſpread, and immediately buried with one turn of the plough.

"During the ſummer, this ground was ploughed ſeveral times; each time in a direction different from the former. My cattle were but little fatigued with this work: the heath, broom, &c. was almoſt entirely deſtroyed, and the ſourneſs of the land was in a great meaſure cured. I had then begun to make compoſts, which were mixed with the dung of the ſtall and ſtable, and proved of ſingular benefit. With their help, I was enabled to manure my newly broken up land ſufficiently; that is to ſay, to lay upon it half the quantity that is generally uſed of dung for the common run of lands. I ſowed this piece with rye, which yielded a plentiful crop. The crops from my former improvements, which I continued to ſow without reſting them, were likewiſe very good this year, excepting that of the laſt, which was alſo under rye, and yielded but a middling produce. My

vineyards

vineyards were now brought into as good order as any in the province; and I continued draining my meadows, and making roads and cauſeys.

"The war then calling me into Bohemia and Bavaria, I foreſaw that I ſhould be abſent ſome time, and conſequently not able to ſpend part of the year in the country, as I had uſed to do; to give directions to my people, and ſee my orders executed. Under theſe circumſtances, that my improvements might not ſtop, I gave the direction of the whole to an intelligent ſervant, who had lived with me a long while, and was married to an excellent houſewife: and to intereſt him the more in the future ſucceſs of my undertaking, I agreed to allow him half of the profits of every kind: ſubjecting him to this only reſtriction, that he ſhould not impoveriſh the ground by too many crops. In this ſtate things went on till the end of the year 1748.

"In the mean time new pieces of land were broken up every year; but not ſo extenſive as the former; the expence of my campaigns not permitting me to lay out upon them ſo much money as before. I even ſtreightened myſelf, not to interrupt the progreſs of my improvements: which, in general, ſucceeded very well. I alſo revived an old method of breaking up land, by cutting off the ſurface with a paring mattock, and then burning it. *See the article* BURN-BAKING.

"During the whole of this time, I was but two years together without viſiting my eſtate, where my preſence was then very neceſſary. In all the other years, I gladly accepted the leave which was given me to ſee how my works went on; though I ſometimes did not ſtay above a fortnight among them. However, this was enough to give an eye to every thing that was doing; which is of great conſequence in undertakings of this kind.

"Peace being reſtored, I reſumed the perſonal guidance of my affairs in the beginning of the year 1749, and placed my old ſervant in a farm which I had to let, where his profits ſat him down at his eaſe. Though he was extremely faithful, and my improvements were carried on very well, yet I found that, for want of due care and attention at certain times, the crops were not equal to what they had been under my immediate direction: a circumſtance which plainly ſhews, that a work like this never thrives ſo well as in the hands of the owner himſelf.

"I now reſolved to purſue my improvements as before the war, that is to ſay, to break up larger tracts of ground every year, than had been done of late. Moſt of my yet uncultivated lands were, and had been from time immemorial, thick covered with high broom, heath, fern, &c. and experience had taught me that theſe were not to be broken up with the plough alone.

"Of all the methods which I tried, none ſeemed to me, as I ſaid before, ſo good as the paring-mattock and burning. I therefore fixed upon this, and, in conſequence, ſent for the workmen I had formerly employed in trials of this kind: but their number not ſufficing for the extent of ground which I purpoſed to break up this year, I ſent for others from a diſtance, and was weak enough to let theſe laſt perſuade me to contract with them at a ſet price, for paring the whole ſurface. I agreed to give them even more than they ought to have had for doing the work ever ſo well; for I was not yet thoroughly acquainted with the nature of this buſineſs. They began it in March; and to earn their money the more eaſily, or rather to rob me, only ſkimmed off the mere ſurface, without hardly touching the roots of the plants, which they ſhould have cut off. When this work was done, as they called it, for the burning part did not belong to them, they immediately came to me, and aſked for their money, which I ſimply gave them, not ſuſpecting the cheat, but only thinking they had earned it very ſoon. When the turf of their cutting was dry, I ordered it to be laid in heaps, and burnt. The ſmall quantities of aſhes which it yielded, made me ſuſpect the roguery: but when I found that the roots in the earth broke ſome of my ploughs, in cutting only a ſingle furrow to cover the ſeed, and that there was no clearing it of clods, I was thoroughly convinced that I had been the dupe of theſe people, and that this paring would be of little ſervice. The wheat ſowed in this ground roſe indeed pretty well, and looked tolerably during part of the winter; but not being able afterwards to ſtrike through the cruſt formed by the remaining matted roots of the plants, moſt of it died, and the little that remained ſcarcely returned the ſeed: nor could this land be recovered till the next year, even by ploughing, breaking the clods, and dunging.

"The bad ſucceſs of this experiment, upon which a great deal of money had been thrown away, tried my patience, but did not diſcourage me. My neighbours began anew to exclaim againſt my projects, as they called them; and numbers of thoſe people who are determined at all events to oppoſe every novelty, be it right or wrong, were pleaſed to vent their ſarcaſms at my expence. I let them talk on. The roguery of the people who had laſt pared my ground did not hinder me from ſtill thinking that this was the beſt way of breaking up new land, eſpecially heaths; and the event has ſhewed that I was right. This check, which was the laſt I received, made me reſolve to take my meaſures better for the future.

"The reſt of my improvement yielded very good crops this year, during which I continued to mend my roads and meadows. Theſe long winded works, for which only a certain ſpace of time, and a certain ſum of money, could be allotted every year, have been continued ever ſince, and indeed are not yet finiſhed. I likewiſe bought this year ſeveral hives of bees; though I had ſome before. Theſe uſeful creatures have multiplied exceedingly; eſpecially in a little garden, where my chief apiary is, ſituated between meadows and heaths, of the flowers of which they are remarkably fond. Though theſe induſtrious inſects thrive perfectly all over the country I am ſpeaking of, yet the inhabitants of theſe parts not only have not a tenth of the number they might keep, but ignorantly follow the old barbarous cuſtom of deſtroying the bees, when they want their honey, inſtead of only taking part. *See the article* BEE.

"I did not agree by the piece for breaking up the land I intended to improve in the year 1750, leſt I ſhould be again deceived; but hired proper labourers by the day. They began their work in March, and finiſhed it about the middle of June; cutting all the way deep enough to go under the cruſt, or net-work, formed by the roots beneath the ſurface; for I took particular care to ſee that this was done. When the turf thus pared, to the thickneſs of about four inches, was dried, piled up, and burnt in heaps from ſpace to ſpace upon this ground, it yielded a conſiderable quantity of aſhes, which en-

riched the ſoil for a long time. Wheat was then ſowed, and the plough eaſily turned up the furrow which covered the ſeed. Women and children eaſily broke the clods of this ground, which was thereby at once brought into good order; the roots of all the wild plants having been effectually cut through, and their ſeeds deſtroyed by the fire. My wheat, by this means un-incumbered with noxious productions of any kind, flouriſhed well, and yielded an excellent crop; as alſo did ſuch other parts of my land as were under corn. The ſucceſs of this year revived my hopes. I now perfected my method of making artificial dung, which, as I have already obſerved, proved of infinite ſervice; and, for manuring my more diſtant lands, I built upon them perpetual kilns, which have always ſupplied me with a ſufficient quantity of aſhes.

"This year I began to plant white mulberies, in order to feed ſilk-worms, and make the inhabitants acquainted with the management of them. I have ſince continued to make plantations of this kind every year, and find them anſwer perfectly well, eſpecially in light ſoils. Several of them are an uſeful embelliſhment to proper parts of my improved lands, and I have alleys of them, which, though not ſuffered to run up high, form a very pleaſing proſpect.

"In 1751, I again ſucceeded perfectly well in my new method of paring and burning. All my cultivated lands now yielded very good crops; and that in particular which I had broke up laſt year, and ſince dunged properly, that is to ſay, with half the quantity commonly uſed upon ground in general, produced more than any other equal ſpace had yet done. From this time I continued to dung all my grounds which were broken up in this manner, every alternate year.

"My improvements were now become ſo extenſive, that I was again obliged to increaſe the number of my ſervants, and of my ploughing cattle. The ſame thing happened more than once after this; but I ſhall not mention it any more. My cattle too, of different kinds, had multiplied ſo much, that I had no longer room for them in the old farm yard, or buildings belonging to it; but plainly ſaw, that if my improvements were enlarged every year in the manner they had hitherto been, I ſhould ſoon want more yards, and more buildings, to keep them in. I accordingly marked out proper places for this purpoſe, and drew plans for more ſpacious buildings.

"As the cattle in this country are ſmall, I bought ſome of a larger ſize in Poictou (from whence we generally have our working beaſts,) and particularly a fine bull, to try if I could mend our breed, and thereby have of my own oxen ſtrong enough for the plough; by which means I ſhould ſave the expence of buying them elſewhere. I have not yet ſucceeded in this, ſo far as I could wiſh; probably becauſe my paſture is not yet good enough. However, my bullocks, proceeding from this race, are much ſtronger and bigger than thoſe I had before, though not large enough to be yoked to the beam, but only before or with others.

"The ground which I broke up in 1752, was pared and burnt in the ſame manner as that of laſt year, and produced an equally good crop. My other corn lands did the ſame; and I have ſince continued, and ſtill continue, at the time of my writing this, to break up a parcel of heath, or other waſte-ground, every year. The ſucceſs has anſwered; ſo that my improved lands now yield me every kind of corn which this country produces. Turkey-wheat, buck-wheat, and millet, have done extremely well in ſome parts of them; and ſo have flax, hemp, and other productions ſuited to the different qualities of the ſoil. In ſome places I have ſowed, at different times, ſeveral ſorts of trees, ſuch as the oak, the beech, the cheſnut, the fir, and others, all of which thrive wonderfully. I have likewiſe planted new vineyards, and find them anſwer perfectly well. All theſe trials convince me more and more, that the very beſt way of preparing land, is by burning it, as I have already ſaid more than once. Thoſe who were formerly the readieſt to blame my undertakings, now ſee their error, and commend them.

"During this ſame year 1752, as well as in the courſe of the following, I drained ſeveral marſhes, and improved other pieces of uncultivated ground, which not being of the heath kind, or proper for paring, were broken up, and fitted for their reſpective crops, whether of corn, or of other plants, as will be more fully related in the ſecond part of this account. I likewiſe ſowed in theſe, as I had done before in other places, trees of every kind, ſome of which have ſucceeded, and others failed, according to the ſoil, and the manner of preparing it. This alſo will be more fully noticed hereafter, when I ſhall ſpeak particularly of the different methods of raiſing trees from their ſeeds; and of the means of obviating the three chief difficulties which muſt of neceſſity be guarded againſt or removed, before one could properly ſet about breaking up any ſort of ground; theſe are, water, ſtones, and large roots; each of which I have found it neceſſary to get rid of, before I could rightly begin any of my improvements.

"I endeavoured this year to make ſome progreſs towards perfecting my inſtruments of huſbandry; my new buildings went on according to the plan I had laid down, and were extended from time to time, in proportion as the products of my enlarged improvements, and the increaſe of my ſtock of cattle, required more room. I likewiſe tried to mend the breed of horſes in this country, where their chief fault is, that they are too ſmall.

"My ſheep were alſo of too ſmall a ſize, and yielded but little wool, which indeed is the caſe throughout this province. I therefore got from Lower Poictou, in the year 1753, two fine rams, of the large kind, called Flemiſh; by which means my lambs are much ſtronger than any other in theſe parts. Several of the males are almoſt as large as their ſires, and I have given ſome of them to my neighbours for rams. They have produced a baſtard breed, which increaſes apace, and, though not ſo large as the Flemiſh, yields more and better wool than our former breed. I got rid of all my old ſheep by degrees, and have now a well-ſized flock: nor do I doubt but that if I could conveniently have purchaſed a whole flock of theſe large ſheep, their breed might have been preſerved without degenerating, and increaſed ſo as to ſupply the place of our preſent inferior ſpecies: for our uncultivated lands would feed a much greater number of ſheep than we even attempt to raiſe.

"In 1755, I diſcovered lime-ſtone upon my own land. This proved a conſiderable ſaving; for I had hitherto been obliged to fetch my lime from a diſtance of near twelve miles. This ſtone, if properly ſearched for, may often be found in places where it is not ſuſpected to lie.

lie. It is eaſily known, by putting a piece of it into the fire till it be calcined, and then diſſolving it in water. This diſcovery, in conſequence of which I built a proper kiln, has enabled me to carry on my buildings with leſs expence than before, and is of ſignal ſervice in affording an excellent manure for my land.

"I began this year to give premiums for agriculture to the inhabitants of my eſtate. They were inſtituted the year before; and I had long uſed my beſt endeavours to inculcate a general love of induſtry, and a reliſh for improvements. My ſucceſs had induced ſeveral others, both landlords and farmers, to follow my example, as well in amending their already cultivated lands, as in the breaking up of new grounds. I aſſiſted them in their undertakings, giving inſtructions to ſome, lending ſeeds to others, and money and tools to ſuch as were honeſt, and wanted them. The better to encourage them all, I had given rewards every year to thoſe who diſtinguiſhed themſelves moſt, and allowed my tenants ſixteen ſhillings for every acre of new ground broken up by them: a regulation which ſtill ſubſiſts.

"To fix theſe people in the induſtrious diſpoſition to which I at length had brought them, no method ſeemed to me more proper than to take them on the weak ſide of almoſt all mankind, intereſt and vanity. Accordingly, I notified in the month of January 1754, that I would diſtribute every year, beginning on the next enſuing feſtival of the Aſſumption, two premiums for agriculture; one, to the perſon who ſhould raiſe the fineſt crop of wheat, and the other to him who ſhould have the beſt field of rye. Each of theſe premiums conſiſts in a ſum of money, not inconſiderable for the country where it is given, and a ſilver medal, engraved for the purpoſe, of the ſize and value of a crown piece. Theſe were, I believe, the firſt premiums ever propoſed in France for this moſt uſeful object; though many have been given for much leſs intereſting concerns. On one ſide of this medal is a ſheaf of corn, with two ſickles, a ſcythe, and a flail; over which are the words, *Premium for Agriculture*, and underneath the date. On the other ſide are my arms, with this inſcription round them; *To excite to induſtry the inhabitants of*, &c. I would not put the goddeſs Ceres of the ancients, or any emblematical figure upon this medal, becauſe, in the firſt place, the ignorant peaſants would not have underſtood its meaning, and in the next, ſome of them might perhaps, hereafter, take it for the repreſentation of a ſaint, and honour it as ſuch; by which means, what I intend only for an object of utility, would become a ſource of ſuperſtition or idolatry.

"A candidate for theſe premiums muſt have at leaſt two acres of land ſowed with either wheat or rye: they are given to the fineſt crop as it ſtands, to avoid all tricks; and if two crops are deemed equally good, the worſt ſoil has the preference. When both the crops and the ſoils are alike, the largeſt extent of ground is entitled to the reward. The inhabitants of the place, in general, meet at the pariſh church on the day appointed; and, after divine ſervice, chooſe from among themſelves five who are not candidates, to inſpect all the fields of corn, and mark thoſe which they think the fineſt. On the next Sunday or holiday, they make their report to the ſame aſſembly. If any one complains that his corn has been unjuſtly paſſed over un-noticed, proper perſons are immediately ſent, to examine whether the complaint be juſt. The aſſembly then appoint the ſame five as before, or others if they pleaſe, to go and inſpect again, with the utmoſt care, the fields which they had marked, and to judge which two of them, one of wheat, and the other of rye, beſt deſerve the premiums. On the next Sunday or holiday they declare their opinions to a general aſſembly of the pariſhioners, as before; and, if no objection be made by any of thoſe whoſe corn has been marked, this aſſembly adjudges the premiums accordingly: but if any one of them appeals, other proper judges are immediately choſen, and directed to inſpect the ſpot. On the next Sunday or holiday, till which the deciſion of the premium is, in this caſe, of courſe put off; theſe laſt examiners make their report, and the matter is then determined. All the people thus ſent by the aſſembly, are paid at my expence. In conſequence of the deciſion of the inhabitants, the premiums are delivered publickly on the feaſt of the aſſumption, after the ſervice at church is over. Thoſe who win them, wear the medal, for a year only, faſtened with a green ribbon to a button-hole of their coat, and have, likewiſe for that time, a diſtinguiſhed ſeat in the pariſh church. Theſe marks of diſtinction ceaſe at the end of the year, when others ſucceed to them; but the medal remains the property of the perſon to whom it was adjudged. He may diſpoſe of it as he pleaſes: yet, though he is no longer allowed to wear it on the outſide of his cloaths, there has not been a ſingle inſtance of any one's ſelling his medal. They all keep it as a badge of honour.

"Theſe rewards have been productive of ſo much good, and have raiſed ſo extraordinary an emulation among my tenants, that I cannot but adviſe every gentleman to practiſe the ſame method upon his eſtate. I intend to inſtitute ſome others, for different productions; and as I am far from having a ſufficient number of people to manage all my lands, if the whole of them was under culture, I have long thought of giving gratuities to ſuch as ſhall have a child within the firſt year of their marriage, to continue this allowance to them ſo long as they ſhall have a child from year to year, and to allot a pretty conſiderable ſum for the family which ſhall have moſt children. Some may, perhaps, think theſe encouragements for propagating the human ſpecies odd, and even ſuperfluous: but they will be of a different opinion when informed, as they may be by the miniſters of moſt country pariſhes, that many peaſants are unwilling to get children, or at leaſt do not chooſe to have more than a very ſmall number, when they might have a numerous offſpring. If my abilities were equal to my will, I ſhould already have formed all theſe uſeful eſtabliſhments. It is generally allowed, and experience has particularly demonſtrated it upon my eſtate, that an increaſe of culture produces an increaſe of inhabitants; and that wherever there is room for two, with the means of ſubſiſting them, a marriage will enſue: but at the ſame time that this means of increaſing population is encouraged by a more extenſive culture of the earth, I ſee no reaſon why proper methods ſhould not be uſed to induce men likewiſe to concur in the ſame laudable end.

"Ever ſince the year 1756, I have continued all my undertakings, and with the ſame ſucceſs as before. Thoſe who ſaw the condition of my eſtate when I firſt came to it, in the year 1737, now ſcarcely know again a ſingle

ſpot of it; ſo much is the face of the country changed. My manſion-houſe, which was formerly ſurrounded with dreary waſtes, vaſt commons, and unbounded heaths, now ſtands in the middle of well cultivated fields; my improvements are become conſiderable both for extent and value; producing all ſorts of grain, and natural as well as artificial graſſes. I have diſperſed in them all kinds of fruit-trees, and divided them into fields of proper ſizes, ſeparated by good ditches planted with quick hedges. Alleys of limes, poplars, white mulberries, cheſnuts, and various other trees, beſides being a conſiderable embelliſhment to the whole, afford convenient paſſes from one field to another, yield food to cattle, and are ſown from time to time. I turn every thing to profit; even my drieſt ſoils. Many of my marſhes are drained, and yield good crops. All my meadows by reaſon of their great extent, are not yet brought to the ſtate in which I wiſh to ſee them; though a great part of them now produces excellent hay. I have mowed ſome of them twice a year, and hope by and by to do the ſame to others; for I intend to water them all, by making dams and ſluices in the brooks and rivulet which paſs through them.

"My vineyards are in good order; and my woods, which are now in regular cuttings, thrive perfectly. Some of theſe, which I have raiſed from the ſeed, have grown ſo prodigiouſly, that a ſtranger would think them much older than they really are. I have made ſome large reſervoirs of water, and ſeveral ponds, entirely new, beſides repairing the old ones. All theſe have ſucceeded, and yield good fiſh. A quarry of mill-ſtones, formerly abandoned, now turns to good account, and I have diſcovered ſeveral quarries of free-ſtone.

"I have been obliged to make ſeveral bridges over the brooks and rivulet which divide my meadows and marſhy grounds, and have carried my roads as far as my improvements extend. Some of theſe roads lie over hills, which could not be avoided; though others have been cut through, at a great expence. Moſt of my outhouſes, which are pretty ſpacious for all my cattle and all the produce of my land, with proper buildings for poultry, barns, granaries, &c. are finiſhed; and I have built farm-houſes with the ſtones which it was neceſſary to take off the lands, in different parts of my improvements, and ſettled in them young men, who are now married, and have children. Though my barns are very large, and not few in number, I have the pleaſure to find that they would not contain all my laſt year's crop of corn: a ſatisfaction which I hope to enjoy ſtill more amply in the next and following years.

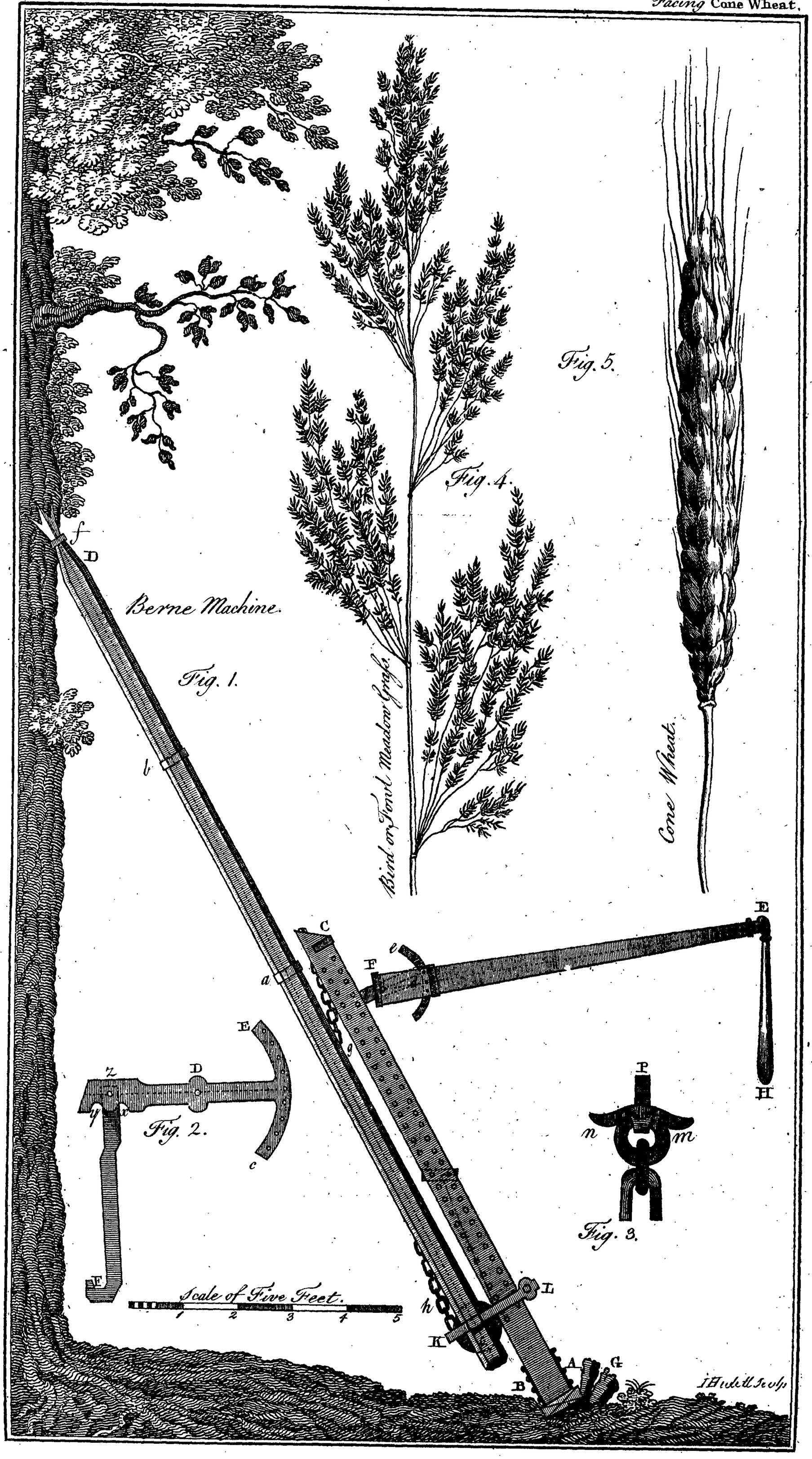
"Thus my eſtate, which formerly yielded ſcarce any thing, now affords every neceſſary for food and raiment. When there, I can, truly ſpeaking, keep a very good table, and be decently cloathed, with only the produce of my own improvements. I have no occaſion to buy any thing except ſalt, ſugar, and ſpices. My farmers have followed my example, ſo far as their means, and the helps that I have given them, have permitted.

"Theſe improvements have, undoubtedly, coſt me a great deal of money; but my income from them will ſoon be proportionably increaſed; beſides which, it is proper to obſerve, that few lands will require ſo great an expence to break them up, as mine have done; owing to the uncommon ſtubbornneſs, inequality, and unkindlineſs of the ſoil: nor will it often be neceſſary to cut through hills in order to make roads, to lay cauſeys over quaking bogs, or to erect ſo many new buildings: though, even if all theſe difficulties ſhould occur, I would ſtill adviſe gentlemen to undertake the improvement. If they follow the directions here given, and profit by my errors, ſo as not to commit the like, I can aſſure them of ſucceſs, at a much leſs expence than it has coſt me, who have thoroughly paid for my apprenticeſhip. I can alſo promiſe, that they will lay their money out at better intereſt, and on better ſecurity, in this, than in any other way: beſides which, they will have the heart-felt ſatisfaction of contributing to the proſperity of their country, to the increaſe of population, and to the enriching of others, at the ſame time that they enrich themſelves.

"I have already ſaid, that when I began my improvements, two and twenty years ago, a third part of the farms in my pariſh were untenanted, for want of farmers who would rent them; that moſt of the inhabitants of my eſtate were very poor, and did not, in general, reap corn enough to ſupport them half the year; that they were grown ſo indolent, that rather than cultivate their ground, which would have afforded them a maintenance, they choſe to beg, like vagrants in the neigbouring diſtricts. Now their ſituation is very different, and they are no longer in that deplorable condition. They are become induſtrious, live by their labour, and beg no longer: they would even be at their eaſe (a happineſs which I ſhall do my utmoſt to procure them), were it not for obſtacles beyond my power to remedy. The pariſh now reaps more corn than it conſumes; ſo that the farmer here is enabled to ſell at the very markets where he uſed to buy. All my farms are tenanted; not a houſe on my eſtate is empty, and if I build a new one it is immediately filled; in ſhort, the number of inhabitants in this pariſh, for I have an exact liſt of all of them, is double what it was in 1737. Such is the hiſtory of my improvements, and ſuch are the effects with which they have been attended." *Memoir ſur les Defrichemens, par.* II.

Burn-beating, or burn-baking, has been long practiſed in ſome parts of England; but in many others is totally exploded, as deſtructive to the land, which it certainly is, as commonly managed, for it has been cuſtomary to burn bake chiefly downs, and other ſuch land of a very thin ſtaple, from whence the fire carries off ſo great a part of the ſoil, that ſuch burn-baked land is afterwards reputed to be quite barren, and of no uſe. And for this reaſon, the owners required great fines, for granting liberty to burn them; which the tenants willingly paid, becauſe they got a great deal of money by it; for the burning, which is not very expenſive, forces the land ſo much, that they were ſure to obtain ſeveral great crops from it, and they continued to crop the land, with robbing crops of wheat and other corn, till the land was quite impoveriſhed, and would at laſt yield none ſufficient to pay the ſmall expence of cultivation; for it has been long remarked of moſt farmers, that they are ſo prejudiced in favour of tillage crops, without allowing the land proper change of crops, reſt, or manure, that they continue plowing every year till the land is quite impoveriſhed; as in the preſent caſe of burn-baking, liming, &c. The very ingenious M. de Turbilli, purſued a quite different method

Facing Cone Wheat.



Berne Machine.

Fig. 1.

Fig. 2.

Fig. 3.

Bird or Fowl Meadow Grass.

Fig. 4.

Fig. 5.

Cone Wheat.

method; he took only a few crops after his burn-baking, and as ſoon as he perceived any abatement in the fertility of his land, he applied proper dreſſings of manure, which reſtored it, and to this judicious practice his great ſucceſs is to be aſcribed. If the owners of land would oblige their tenants to purſue the ſame method, inſtead of prohibiting entirely their burn-beating, it might in time become a general ſyſtem in huſbandry, very much to their own and tenants advantage, and to the great benefit of the public.

The difficulty which this gentleman found in ſowing the proper quantity of ſeed upon his newly burn-baked lands, may be entirely removed by ſowing them with a drill plough, which can be managed with great eaſe, in ſuch a light ſoil, and where is no obſtruction from either ſtones or roots. The occupier, in this caſe, would be under no apprehenſion of damage to his crop from weeds, which deters them from allowing the rows of corn a proper diſtance in other lands; and if the rows are ſown at ſuch a diſtance, as to admit a ſmall plough to come between them; or if only eighteen or twenty inches diſtant, a hoe, with ſeveral tines in it, would cultivate the intermediate ſpaces to great advantage, and at the ſame time would ſo much break the clods, and pulverize the ſoil, that it would be much enriched by it, and ſave great part of the expence of the tillage for the next crop. The ſpikey roller would alſo be very ſerviceable, to break the clods and half-burnt turfs, before the land is ſown, much more expeditiouſly, and at a leſs expence than beating and breaking them by hand.

"The marquis obſerves, that, as to the little freeholders and farmers, who have but a few acres, and after having grubbed, cleared and burned them, in the manner above-mentioned, labour them by the ſtrength of their arms, with the pick-ax, ſhovel, ſpade, or other inſtrument, and wiſh to ſow in one of the above recited methods; they muſt take care to mix the aſhes well with the ſoil, and to carry off all the ſtones and roots. Theſe are they who will in proportion reap the moſt corn the firſt year, as digging ſtirs the ground much better than ploughing. Were it poſſible to cultivate all thus with the ſpade, it would produce a great deal more."

This is undoubtedly a juſt obſervation, and the reaſon of the ſpade tillage being ſuperior is, that the ſpade breaks the ſoil moſt, into the ſmalleſt parts, and alſo goes deeper in it, than the plough does in the firſt culture. Every means therefore of pulverizing the ſoil, and deeper than is commonly done at firſt in burn-baked lands, ſhould be adopted. The ſpikey roller will be very ſerviceable here: for the earth having been dried by the fire, this roller will make the ſurface very fine; and ſo it will the ſoil below, by ploughing it up, and drawing the roller two or three times over it, eſpecially if the land is harrowed between the rollings, to bring up the clods; or if that is not ſufficient, by alternate ploughing and rolling. In this manner this dry ſoil may be broke, even more effectually than by digging with the ſpade, and at a much ſmaller expence.

COMPOST, an uſeful ſort of manure, conſiſting of earth, dung, lime, clay, &c. according to the nature of the ſoil, well mixed and rotted together, till it forms one united maſs. *See* DUNG-HILLS.

CONE-WHEAT, a ſpecies of wheat, called in ſome parts of Somerſetſhire, blue ball. Some of the ears of this wheat have awns, and others none. *See* Plate IV. Fig. V.

CONIFEROUS, an epithet applied to ſuch trees as bear cones, as the fir, pine, cedar, &c.

CONSOUND, the ſame with bugle. *See the article* BUGLE.

CONSUMPTION, a diſeaſe incident to horſes, conſiſting in a waſte of muſcular fleſh, attended with a ſlow fever.

When a conſumption proceeds from a defect in a horſe's lungs, or any principal bowel, the eyes look dull; the ears and feet are moſtly hot; he coughs ſharply by fits; ſneezes much, and frequently groans with it; his flanks have a quick motion; he gleets often at the noſe, and ſometimes throws out a yellowiſh curdled matter, and he has little appetite to hay, but will eat corn, after which he generally grows hot.

As to the cure, one of the principal things is bleeding in ſmall quantities, a pint, or pint and half, for ſome horſes is ſufficient, which ſhould be repeated as often as the breath is more than ordinarily oppreſſed. Pectorals may be given to palliate preſent emergent ſymptoms; but as diſſections have diſcovered both the glands of the lungs, and meſentery to be ſwelled, and often indurated, the whole ſtreſs lies on mercurial purges, and the following ponderous alteratives, given intermediately.

Take native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the ſame quantity of gum-guaiacum and nitre: give the horſe an ounce of this powder, twice a day, wetting his feeds.

The ſpring graſs is often extremely ſerviceable, but the ſalt-marſhes are to be preferred, and even to be more depended on than medicines; for great alterations re thereby made in the blood and juices, and no ſmall benefit ariſes from open air, and proper exerciſe.

But it may be worth obſerving, that a horſe frequently relapſes after appearances of amendment; when a yellowiſh gleet, or curdled matter, runs from his noſe, and he grows emaciated, is much addicted to ſweat, heaves much with a reduplicated motion, and has a ſhort rattling coagh; under theſe circumſtances there can be little hopes of his recovery, or any future ſervice from him, conſequently to ſave farther expences, the beſt way would be to diſpatch him as an incurable. *Bartlet's Farriery, p.* 76.

CONVOLVULUS. the ſame with bind-weed, *See the article* BIND-WEED.

COOM, the ſoot that gathers over the mouth of an oven; alſo a compoſition of tar and greeſe, with which the axle-trees and boxes of the wheels of carriages are daubed or ſmeared over, in order to leſſen the friction.

COOP, a tumbrel or cart encloſed with boards, to carry dung, ſand, grains, &c. which would otherwiſe fall out.

COOP, likewiſe ſignifies a pen, or encloſed place, where lambs, poultry, &c. are ſhut up in order to be fed.

COPPICE, low woods, cut at ſtated times for poles, fuel, &c.

"If you are to plant a coppice, ſays the ingenious Mr. Liſle, it is a good way to ſet your plants in trenches, as one raiſes quickſet hedges, and not to ſow ſeeds, for they are tedious in coming forward, and will tire one's patience in weeding them. I would not ſet above four plants in twelve feet ſquare, and at regular diſtances, ſo that the benefit of ploughing might not be loſt; and then at ſix or ſeven year's growth I would plaſh, by laying the

the whole ſhoot, end and all, uuder the earth in the trenches, which would not therefore be choaked, but ſhoot forth innumerable iſſues: this, by great experience, oak, aſh, hazle, and withy, will do.

"In our parks we never ſet leſs than an hundred plants in a double chaſed lugg; and if the earth turned up ſuch rubbiſh and ſtony ſtuff that the edge of earth on which they are to plant, is too narrow for a double chaſe, then they always ſet eighty plants on a ſingle chaſe in a lugg.

"I obſerve the ſedgy graſs comes not up in felled coppices the firſt ſummer; conſequently the young ſhoots have a year's ſtart of that graſs; the next ſummer the ſedgy graſs comes up, and grows ancle high, equal with the two year's ſhoots: but what harm can it then do to the wood? The third year the ſedgy graſs dies, and you ſee no more of it. I ſpeak this, in anſwer to the countryman's objection, who pleads for putting ſome ſort of cattle into coppices to keep down the ſedge, which he pretends otherwiſe will choak and damage the plants. I have experienced this to my coſt.

"It was May the ſixth, in the year 1701, that I bought ſome yearlings; and aſked the farmer, if I might not put them in the coppice till midſummer: the farmer ſaid, not yet, by any means, for fear they ſhould be oakered, that is, leſt they ſhould bite off the oak-bud before it came into leaf, which might bake in their maws and kill them; but after the oak-bud was in leaf, it would be ſafe enough. The higher coppices are fit for yearlings, and the coppices of the laſt year's growth for hog-ſheep in winter. My ſhepherd ſaid, what the farmer obſerved as to the oak-bud was true; but he thought that the year was ſo backward, that they were not yet come out, and ſo there could be no danger at preſent. Farmer Elton ſaid, his father had loſt abundance of yearlings by the oak-bud, by putting them into the coppices while that was out. I have ſince experienced the ſame, and I have ſince remarked the ſame.

"It is a common ſaying, that calves will not crop in woods: but I put ſix calves in my woods, in November, which very much cropt the yearling-ſhoots. All huſbandmen I told of it very much wondered at it; but the reaſon to me was clear, viz. On firſt putting them in there came three or four days hard froſt, with a ſhallow ſnow, and a rime that laid on the bennetty graſs, ſo that they could not come at the ground, but only met with briar leaves, of which, though I had plenty, they were but thin diet to depend on altogether; yet together with other pickings, would have been a noble maintenance for them, if they could have come at the rowet: this ſtreightneſs of fodder brought them to the neceſſity of cropping the young ſhoots, which they afterwards continued to do, having got the habit of it, and finding, when the weather came ſevere, the ſhoots to be toothſome, though the rowet in the coppices would have been ſufficient.

"For a general rule, newly weaned calves are leſs hurtful to newly cut ſpring-woods than any other cattle, eſpecially if there be abundance of graſs; and ſome ſay, colts of a year old will do no harm: but the calves muſt be permitted to ſtay a while longer, and ſurely the later you permit beaſts to graze the better.

"Letting coppice-wood grow to ſixteen or ſeventeen years growth is of great ſervice to young heirs, becauſe by ſo many years growth their backs are caſe-hardened, and able to withſtand the cold, when the coppice is cut, and they muſt ſtand naked, whereas, when coppices are cut at ten and eleven years growth, the barks of the young heirs are ſo tender, that they are ſtarved with cold air and winds. Ivy itſelf, ſays Evelyn, the deſtruction of many a fair tree, if very old, and taken off, does frequently kill the trees by a too ſudden expoſure to the unaccuſtomed cold.

"When coppice-wood is of fourteen or fifteen years growth, it will yield a better price in proportion than young wood, becauſe it will be applicable to more uſes, and particularly in the coopers buſineſs; for he will uſe the withy and ſome of the aſh for hoops and wine hogſheads; another part of the aſh may ſerve for prong-ſtaves, rake-ſtaves, and rath-pins for waggons, and the reſt may be parcelled out for hurdle and ſtake-rods.

"Oaken ſtems of fourteen years growth are, in my woods, which in a great meaſure conſiſt of them, as high as the aſh or withy, and meaſure more in the diameter; for oaken ſtems are ſtronger at root, and will hold growing longer than aſh, withy, or hazle. When hazle grows ſpriggy in the body, and ſhoots forth from the ſides of the back, it is a ſign that it has given out, and done growing at the top.

"Coppice-wood, in hedging and hurdling, wears much better and longer if cut between Michaelmas and Chriſtmas, but ſells beſt in faggots, if cut between Chriſtmas and Lady-day, becauſe it ſhrinks leſs, and is much ſwelled, and looks beſt to the buyer. The method at Crux-Eaſton, and the hill country adjacent, is only to oblige the buyers to rid the coppice by Midſummer; they think the coppices are not harmed, if rid by the time the Midſummer-ſhoots ſpring up, but they had not rid this year, 1697, by the latter end of July.

"It is obſerved, that coppice-wood, cut for hedging at the latter end of winter, will not endure ſo long by a year as that which is cut at the beginning of winter; which, as I believe, may not only be, becauſe the wood late cut, is cut after the ſap has riſen, or attenuated by the ſun, but alſo oftentimes becauſe it is not cut long enough before ſuch rarefaction is made; for, if a tree, or a cyon cut to be grafted, as Quinteny affirms, will endure many weeks of the winter out of the ground, or without being grafted, and, when ſpring ſhall come, it will by virtue of the ſap inherent in it, when attenuated put forth buds for ſome time, till it dries away; ſo it follows, that the ſap inherent always in the ſtem of the wood, if not cut ſo early as to have long time to dry, may be put into motion at ſpring, ſo as to effect the abovementioned inconvenience; therefore I hold hedging-wood and fire-faggots ſhould be cut in October.

"It is a common practice of huſbandmen to fell their hedge-rows, and ſmall brakes within the grounds, thoſe years they ſow the grounds with wheat; but ſuch perſons ought well to conſider, firſt, whether ſuch land, after the wheat is off, will not bear a rowet too long for ſheep to eat, and, if ſo, great cattle muſt be put in to eat up the long rowet, and the ſooner the better for their tooth; and then attendance muſt be given by a cow-keeper by day, before the harveſt is in, and conſequently the wages dearer, and when you may have many other offices to employ ſuch a perſon in: therefore, in ſuch caſe, my advice is to let the hedge rows ſtand till after the wheat crop be got in, when great cattle may be ſuffered to feed down the rowet without prejudice to the hedge.

hedge-rows, and at that time of the year ſuch graſs is wanted by night; and during the future three crops, it is to be ſuppoſed the rowet will not be ſo large, but ſheep may overcome it, nor will they very much prejudice the young wood." *Liſle's Huſbandry, vol.* II. *p.* 245.

In raiſing coppices, great care ought to be taken that the wood they are to be compoſed of be ſuch as is proper for the ſoil you raiſe them on, and that it be proper for the uſes you deſign to ſell it for, which you muſt be regulated in by the vent you have; and let the profits reſulting from your under-wood regulate the thickneſs of your ſtandards; for in proportion as they are thicker or thinner, they will do more or leſs injury to your under-wood. You ſhould likewiſe conſider at what growth you can ſell your under-wood; only remember that the older and taller your under-wood is, the better it is both for fuel and for what ſtandards you leave, becauſe they will be taller and ſtraiter, by being forced up by the wood that grows about them; though a deep ſoil contributes much to their ſpring. It is alſo neceſſary, about the time of your felling, to lay out your ſeveral falls, that you may have an annual ſucceſſion, to yield a yearly profit. But though the ſeldom felling of coppices yields the more and better wood; yet the frequent cutting of it makes it thicken, and gives room for the ſeedlings to come up. If many trees grow in the coppice that is to be cut down, fell both them and the under-wood together, cutting off the ſtubs as near the ground as convenient, and thoſe of the under-wood a-ſlope and ſmooth, and not above half a foot from the ground; and ſtock up the roots of the timber-trees, if they ſend forth no ſhoots, in order to make room for ſeedlings and young roots to grow.

The under-wood may be cut from the beginning of October to the latter end of February; but February is the beſt month to cut wood in, where you have but a ſmall quantity to fell, that you may do it before the ſpring comes on too much: take great care to prevent the carters from bruſhing againſt the young ſtandards, and let all your wood be carried out by Midſummer, and made up by the end of April at the fartheſt; for if the rows and bruſh lie longer unbound or unmade up, it will ſpoil many of the young ſhoots and ſeedlings. If the winter before you fell, you encloſe it ſo as to keep all cattle out of it, your care and trouble will be well recompenſed.

Your elder underwood may be grazed about July, or in winter, but, for a general rule, newly weaned calves are the leaſt prejudicial to new cut wood, where there is abundance of graſs; and ſome ſay colts of a year old; but then they muſt be drove out by the beginning of May at fartheſt. However, if nothing at all be ſuffered to come in, it will be better. In this every man's experience muſt direct him.

If your woods happen to be cropt by cattle, it will be better to cut them down, and they will then make freſh ſhoots; whereas what has been bit by the cattle, will be otherwiſe ſtunted for ſeveral years before it will take to its growth. *Mortimer's Huſbandry, vol.* II. *pag.* 69.

CORD *of Wood*, a certain quantity of wood for fuel, properly ſtacked up; ſo called becauſe it was formerly meaſured with a cord. The dimenſions of a ſtatute cord of wood are eight feet long, four feet high, and four feet broad.

CORE, a diſorder incident to ſheep, occaſioned by worms in their liver, reſembling a plaice, or flounder.

A ſheep, if chiefly fed with hay, will live a year after being affected with this diſtemper, by which time he will have a water-bladder as large as an egg, under his throat; at the ſame time his eyes, mouth, and gums, will be white.

If any ſheep in a flock core during the winter, it will be eaſily ſeen at ſhearing-time; for ſuch ſheep will be poorer than the reſt; their wool alſo will run into threads, twiſting together at the ends, and look ſomewhat like teats. The laſt particular is not however a certain ſign of a ſheep's being cored; for ſometimes the wool of very ſound ſheep will be apt to run together into threads; and the finer the wool the more apt it is to twiſt together in that manner. There is no method of curing this diſtemper hitherto known. *Liſle Huſbandry, vol.* II. *page* 207.

CORIANDER, the name of a plant formerly much cultivated in England; but at preſent little of it is ſown.

The ſeeds ſhould be ſowed in autumn on rich land; and when the plants are come up, they ſhould be hoed out to about four inches diſtance, every way, clearing them from weeds. By the above management, the plants will grow ſtrong, and produce a greater quantity of good ſeeds. *Miller's Gard. Dict.*

CORN, a general name for grain that grows in ears, not in pods, as wheat, barley, &c.

If corn be lodged, it may be cut before it is quite ripe; and if blighted, it cannot be cut too ſoon. But if neither of theſe accidents happen, both wheat and barley ſhould be ſuffered to ſtand till full ripe. The grain will alſo grow plumper by being left a while in the field after cutting, to take the dew; but the ſtraw will be injured by it; nor muſt it by any means be laid up damp in the mow, leſt it heat, and become what is called mow-burnt; and perhaps take fire. A great number of weeds will produce the ſame effect, if the corn be houſed before their ſtalks are ſufficiently withered.

A correſpondent of the authors of the Muſeum Ruſticum tells us, that in the year 1763, he had twenty acres of barley, which was rather weedy at harveſt; on which account he was deſirous of giving it as much field room as he could conveniently; but the weather promiſing to be very wet, he was obliged to cart his barley, which he put into the bay of a large barn.

Whilſt this work was going forward, he was called away, and in his abſence his ſon got a horſe upon the mow to tread it; by which means, the weeds, not being thoroughly dry, cauſed the barley to heat to ſo violent a degree that he was very apprehenſive of its firing.

"My men, adds he, were in a violent hurry to get it out of the barn; but this I would by no means conſent to. I however ordered one of them to get upon the mow with a cutting knife, and cut in it a round hole like a well. He began the work; but in about five minutes, being almoſt overcome by the heat, I ſent another to relieve him; and thus they worked ſpell and ſpell, till they got to the bottom.

"This round hole ſaved my barley, and perhaps my barn too; for it formed as it were, a chimney or flue to carry off the heat." *Muſeum Ruſticum, vol.* III. *p.* 365.

For

For the method of preſerving corn after it is threſhed, *ſee the article* GRANARY. And for preſerving it in the ſtraw, *ſee* REEK.

CORN-CROWFOOT, a weed very common among the corn. It has an upright ſtalk; the leaves are of a pale green, and cut into long, narrow, acute ſegments. The flowers are much ſmaller and paler than the crowfoot of the paſtures: but the ſeed-veſſels are the moſt remarkable, being covered all over with prickles. *See* Plate V. fig. 33.

CORN-FLAG, a very troubleſome weed, multiplying exceedingly by its roots. It has a round compreſſed tuberous root, which is of a yellowiſh colour, and covered with a brown furrowed ſkin, like that of the vernal crocus. From this root ariſes two flat ſword-ſhaped leaves, which embrace each other at their baſe; and between theſe ariſes the flower-ſtalk, which grows near two feet high, having one or two narrow leaves embracing it like a ſheath. This ſtalk is terminated by five or ſix purple flowers, ſtanding above each other at ſome diſtance, and ranged on one ſide of the ſtalk; each of theſe has a ſheath, which covers the flower-bud, before it expands, but ſplits open lengthways when the flowers blow, and afterwards ſhrivels up to a dry ſkin, which remains about the ſeed-veſſel, till the ſeeds are ripe, which is in the beginning of Auguſt. The flowers come out in the beginning of May, or in June. Some of theſe flowers are white, and others fleſh-coloured.

Corn-flag is extremely difficult to root out, as every part of the root will grow. The beſt manner of extirpating it is that already mentioned under the article colts-foot. *See* COLTSFOOT.

CORN-MARYGOLD, the name of a very troubleſome weed, of which there are two ſpecies, one common in corn-fields, and the other in moiſt paſtures. The leaves of the firſt ſort embrace the ſtalks, the upper being jagged, and the lower indented like a ſaw. The ſecond is, by C. Bauhine, called the greater wild daiſy, with a leafy ſtalk. It riſes with ſtalks near two feet high, garniſhed with oblong indented leaves, which embrace the ſtalks with their baſe. Each of theſe ſtalks is terminated by one white flower, ſhaped like that of the daiſy, but four times as large. It flowers in June. *See* Plate V. fig. 34.

The corn-marygold has a perennial woody root, which ſtriking deep requires a conſiderable quantity of food, and therefore muſt be a great enemy to the corn. Conſiderable pains muſt be taken before this weed can be extirpated, as it is highly probable, that, beſides multiplying by its roots, its ſeed will grow, if ploughed in, as that of the garden marygold will do when dug in. Deep and repeated hoeings are therefore neceſſary, before it runs to ſeed.

CORN-PARSLEY, the name of a low branching plant common among corn. The branches grow thick together, and are knotted and crooked. The flowers grow cloſe together after the manner of parſley, and are of a white colour inclining to yellow. The ſeeds are large in proportion to the plant; and are ſet about with little crooked briſtles, which makes them adhere to the ſtockings in great plenty, when the ſeeds are ripe, which is generally about harveſt. *See* Plate V. fig. 35.

CORN-WORM, the inſect lately obſerved in France to be ſo very deſtructive to corn. *See the article* BUTTERFLY.

CORNER-TEETH, the teeth which appear when a horſe is coming five years old. *See the article* AGE.

CORONET, the loweſt part of a horſe's paſtern, which runs round the coffin, and is diſtinguiſhed by the hair which joins and covers the upper part of the hoof.

COSH, the ſame with pods. *See the article* POD.

COSSART, or *Coſſet Lamb*, a lamb left by its dam's dying before it is capable of ſhifting for itſelf; or it is a lamb taken from an ewe that brings two, three, or four lambs at a yeaning, and conſequently is incapable of bringing them all up. The word is alſo applied to a colt, calf, &c.

In either of theſe caſes, if there be not another ewe at liberty to ſuckle it, it muſt be brought up by the hand, or periſh. By an ewe at liberty is meant, one that has, by ſome accident, loſt her lamb, and has milk enough to ſuckle a lamb yeaned by another.

COSTIVENESS, a complaint to which horſes are often ſubject; ſometimes occaſioned by violent and hard exerciſe, eſpecially in hot weather; and ſometimes by ſtanding long at hard meat, without graſs, or other cleanſing diet, and with very little exerciſe.

The cure for this complaint is eaſy, only by giving him an open diet for ſome time; and if any thing more is wanting, lenitive mild purges are the moſt likely to ſucceed. Such as Glauber's ſalts with lenitive electuary, four ounces of each, diſſolved in warm ale or water, and repeated every other day. This, with ſcalded bran given every day, will ſoon remove the complaint, and carry off the viſcid ſlime engendered in the guts, which is generally the cauſe of his coſtiveneſs.

But there is another kind of coſtiveneſs in horſes, which is much harder to be removed, viz. that which ſeems to be natural, or grown into a habit. We find ſome very good horſes liable to this diſorder; and, when it is of long continuance, they are apt to grow lean and emaciated, feel hot and dry, their hair ſtaring, and there is danger of ſome approaching ſickneſs.

This diſorder is not eaſily removed, nor is it often neceſſary to bring ſuch horſes into a contrary habit; for where this is natural, it may proceed from a more than ordinary ſtrength and rigidity in the ſmall fibres of the ſtomach and guts, which makes them digeſt their aliment well, and retain their excrements longer; and when ſuch a habit can be kept within any proper medium, the horſe will continue in ſtrength and vigour, without any inconvenience; and it is obſervable, that theſe horſes are, for the moſt part, able to endure great fatigue and labour. However, it is proper to give ſuch horſes, at all convenient times, an opening diet. For if this habit happens, by any accident, to grow into an habitual coſtiveneſs, ſo as to produce ill effects, as heat, dryneſs of the conſtitution, little ſcabby eruptions over the ſkin, and a rough coat, it will then be neceſſary to remove it in ſome degree, which cannot be done but by a continual uſe of emollients, joined by a looſe opening diet.

Purging is here alſo neceſſary, and ought by all means to be complied with; but purging in the common way with Barbadoes or other plantation aloes, ſeldom has any great effect longer than the purge is working; for when that is over, the ſame habit of coſtiveneſs generally returns as ſtrong as ever. Scalded bran, and the common opening diet, ſeldom makes any great alteration in theſe horſes. The aloetic purges will ſcarcely work, eſpecially if they are made ſtrong, for they then chiefly run off by urine

PLATE. V.

Facing Corn-crowfoot.

The figures from 1 to 31, Inclusive, are explained in the Article Butterfly.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig 16

Fig. 17.

Fig. 18.

Fig. 19

Fig. 20.

Fig. 21.

Fig. 22.

Fig 23.

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

Fig. 29.

Fig. 30.

Fig. 31.

Charlock.

Corn Crowfoot.

Corn Marygold.

Small Corn Parsley.

Fig. 32.

Fig. 33.

Fig. 34.

Fig. 35.

T. Hulett Sculp.

arine, which does the creature little ſervice in this caſe. But after the common purges have failed, the following will ſucceed beyond expectation.

Take ſuccotrine aloes, ſix drams; ſpermaceti, half an ounce; fœnugreek-ſeeds in powder, two ounces; make the whole into two balls, with a ſufficient quantity of honey, or common treacle, and give them in a morning faſting.

Let the horſe have ſcalded barley inſtead of ſcalded bran, and the liquor of the barley for his drink, milk warm. This will work very gently, where ſtronger purges have little other effect upon coſtive horſes than to gripe and make them ſick. It ought to be repeated once in four days, and may be continued till he has taken ſix doſes. Let him have an ounce of fœnugreek-ſeeds once a day, in one of his maſhes, and when the purgation is over, continue the uſe of the fœnugreek; and ſometimes give linſeed in the ſame manner, either in his dry or moiſt feeds, until the horſe grows ſmooth and well coated, and his dung moiſt and in good order. *Gibſon's Farriery, vol.* II. *p.* 134.

COTYLEDONS, rinds, or huſks.

COUCH-GRASS, *quick graſs*, *knot-graſs*, or *dog-graſs*, is one of the worſt of weeds among corn, and one of the moſt difficult to extirpate in arable land; every joint of its long creeping roots being capable of ſoon producing a new plant, after thoſe roots have been broken by the plough. The uſual way of deſtroying it, is by laying the land fallow in ſummer, and frequently harrowing it well over, to draw out the roots, every piece of which ſhould then be burnt, for the reaſon already mentioned. Where this is carefully done, the ground may be ſo well cleanſed in one ſummer, that the remaining roots will not do any great injury to the enſuing crop: but the beſt way is to ſow the land in which this weed prevails with ſuch plants as require the horſe-hoeing culture. The blade of this graſs is ſo rough, that the cattle will not feed upon it when green.

COVERT, ſheltered, not open, not expoſed.

COUGH, a convulſive motion of the lungs, being an effort of nature to throw up ſome offending matter.

Horſes are very ſubject to coughs, which are ſometimes occaſioned by colds, and often by the injudicious treatment of an inflammation of the lungs; the conſequence of which is often ſettled habitual coughs, which frequently degenerate into aſthmas, and broken wind.

Nothing has more perplexed practitioners than the cure of ſettled coughs; the cauſe of which, perhaps, has been their want of attention to the different ſymptoms which diſtinguiſh one cough from another; for without ſtrict obſervance thereof, it is impoſſible to find out the true method of cure.

Thus, if a horſe's cough is of long ſtanding, attended with loſs of appetite, waſting of fleſh, and weakneſs, it denotes a conſumption; and that the lungs are full of knotty, hard ſubſtances, called tubercles, which have often been diſcovered on diſſection.

The following ſigns denote when the cough proceeds from phlegm, and ſlimy matter, that ſtuff up the veſſels of the lungs.

The horſe's flanks have a ſudden quick motion; he breathes thick, but not with his noſtrils open, like a horſe in a fever, or that is broken winded; his cough is ſometimes dry and huſky, ſometimes moiſt, before which he wheezes, rattles in the throat, and ſometimes throws out of his noſe and mouth great gobs of white phlegm, eſpecially after drinking, or when he begins or ends his exerciſe, which diſcharge commonly gives great relief. Some ſuch horſes wheeze and rattle to ſuch a degree, and are ſo thick winded, that they can ſcarce move on, till they have been out ſome time in the air; though then they will perform beyond expectation.

Theſe are properly aſthmatic caſes, and ought to be diſtinguiſhed in their ſymptoms from that purſiveneſs and thick windedneſs we ſee in ſome horſes, occaſioned by too full, or foul feeding, want of due exerciſe, or their being taken up from winter's graſs. But theſe two laſt caſes are eaſily cured by proper diet and exerciſe; the one by lowering his keeping, and the other by increaſing it.

The above aſthmatic caſe proves often very obſtinate; but, if it happens to a young horſe, and the cough is not of long ſtanding, it is greatly relieved, if not totally cured, by the following method.

If the horſe is full of fleſh, bleed him plentifully; if low in fleſh, more ſparingly; which may occaſionally be repeated, on very great oppreſſions, and difficulty of breathing, in proportionate quantities.

As mercurial medicines are found remarkably uſeful in theſe caſes, give a mercurial ball, with two drams of calomel, over night, and a common purge the next morning: or the following, which is much recommended by Mr. Gibſon:

Take gum-galbanum, ammoniacum, and aſſa-fœtida, of each two drams; fine aloes, one ounce; ſaffron, one dram; oil of anniſeeds, two drams; oil of amber, one dram; with honey enough to form into a ball.

They may be repeated at proper intervals, with the uſual cautions. In the intermediate days, and for ſome time after, one of the following balls may be given every morning:

Take cinnabar of antimony, finely levigated, ſix ounces; gum-ammoniacum, galbanum, and aſſa-fœtida, of each two ounces; garlic, four ounces; ſaffron, half an ounce: make into a paſte for balls, with a proper quantity of honey.

Theſe balls are extremely well calculated for this purpoſe: but if they are thought too expenſive, the cordial ball may be given, with an eighth part of powdered ſquills and Barbadoes tar: or equal quantities of the above, and the cordial ball, may be beat up together; and where they can be afforded, balſam of Peru, balſam of ſulphur, and flower of Benjamin, would undoubtedly, added to the cordial ball, make it a more efficacious medicine, in caſes of this ſort, as thus:

Take of the pectoral or cordial ball, one pound; balſam of Peru, half an ounce; balſam of ſulphur aniſated, one ounce; flower of Benjamin, half an ounce; honey as much as is ſufficient to form them into a paſte: give the ſize of a pigeon's egg every morning.

Exerciſe in a free open air is very ſerviceable, and the diet ſhould be moderate. Horſes ſubject to any inward oppreſſions of the lungs, ſhould never be ſuffered to have a belly full; that is, they ſhould never be permitted ſo to diſtend their ſtomach with meat or water, as to preſs againſt the midriff, which of courſe would hinder reſpiration. Their hay ſhould even be abridged, given in ſmall quantities, and ſprinkled with water; and their uſual allowance, both of corn and water, ſhould be divided into ſeveral portions: by ſuch a regulation in diet, horſes may be ſo recovered as to do great ſervice; and in

all diſorders of the lungs, it is what ſhould principally be attended to.

The following are the ſymptoms of a dry cough, or aſthma.

The horſe afflicted with this cough, eats heartily, hunts, and goes through his buſineſs with alacrity, appears well coated, and has all the ſigns of perfect health; yet he ſhall cough at particular times almoſt inceſſantly, without throwing up any thing, except that the violence of the cough will cauſe a little clear water to diſtil from his noſe. Though this cough is not periodical, yet ſome of theſe horſes cough moſt in a morning, after drinking.

This may properly be ſtiled a nervous aſthma in a horſe, as probably it chiefly affects the nerves in the membranous parts of the lungs and midriff; and is a caſe very doubtful at leaſt, if not incurable: but when the horſe is young, the following method may be ſucceſsful.

Take away firſt a moderate quantity of blood; then give him two drams of calomel, mixed up with an ounce of diapente, for two nights; and the next morning a purging ball. Keep him well cloathed and littered, and feed him with ſcalded bran and warm water.

Once in eight or ten days this purge may be repeated, with one mercurial ball only, given over night.

The following balls may then be taken, one every day, about the ſize of a pullet's egg, the horſe faſting two hours afterwards; and ſhould be continued two months, or longer, to be of real ſervice.

Take native cinnabar, or cinnabar of antimony, half a pound; gum-guaiacum, four ounces; myrrh, and gum-ammoniacum, of each two ounces; Venice ſoap, half a pound: the cinnabar muſt be finely levigated, as before obſerved, and the whole mixed up with honey, or oxymel ſquills.

The following alſo will be found a uſeful remedy in obſtinate dry coughs:

Take gum-ammoniacum, ſquills, and Venice ſoap, of each four ounces; balſam of ſulphur, with anniſeeds, one ounce; beat up into a maſs, and give as the former.

Theſe mercurial and ponderous medicines are well adapted to open obſtructions in the lungs, and prevent thoſe little knots, or tubercles, which ſo frequently ulcerate, and lay the foundation of an incurable malady, or conſumption; but the common pectorals alone will avail nothing in old ſtubborn coughs, their efficacy being loſt in the long tour they have to make, before they come to the lungs; and indeed, were it otherwiſe, without they had ſuch powerful openers joined with them, they would be of little conſequence; for where there are expectations from medicines, ſuch are chiefly to be relied on, which have a power of diſſolving and attenuating the viſcid humours, opening the ſmall obſtructed veſſels, and promoting all the natural ſecretions.

Before we conclude this article, it may be neceſſary to obſerve here, that ſome young horſes are ſubject to coughs on cutting their teeth, their eyes are alſo affected from the ſame cauſe. In theſe caſes always bleed, and if the cough is obſtinate, repeat it, and give warm maſhes; which, in general, are alone ſufficient to remove this complaint. But when the cough is an attendant on worms, as it often is in young horſes, you muſt give ſuch medicines as have a power to deſtroy thoſe animals: particularly mercurial phyſic, at proper intervals, and intermediately half an ounce of Æthiop's mineral, mixed up with the cordial; or pectoral balls may be given every day. *See* WORMS. *Bartlet's Farriery, page* 51.

But horſes are not the only animals ſubject to this diſorder: it is ſo common among ſheep, that one ſeldom paſſes near a flock without hearing it in ſeveral. They cure this diſorder in the Ardennes by throwing up their noſtrils with a ſyringe blanched almonds pounded in wine, for ſix or eight days ſucceſſively.

COUPLES, ewes and lambs.

COW, the female of the bull.

Cows are very ſerviceable to the huſbandman for work, and for the ſupply of the family and market. The beſt breed is reckoned that of Yorkſhire, Derbyſhire, Lancaſhire, Staffordſhire, &c. and a good hardy ſort for fatting on barren, or middling ſort of land, are your Angleſey's and Welſh. The hardieſt are the Scotch; but the beſt ſort of cows for the pail, only they are tender and require very good keeping, are the long-legged, ſhort-horned cow, of the Dutch breed, which is to be had in ſome places of Lincolnſhire, but moſtly in Kent; many of theſe cows will give two gallons of milk at a meal: but in furniſhing yourſelf with cattle, you ought to conſider the goodneſs of your land, and the uſe you deſign your cattle for, as whether for breed, milk, or work.

If for breed, the better your land is, the larger may your kine be; and the cheaper, the more will be your profit: only obſerve, that of what kind ſoever your breed is, that it be the beſt of the ſort, and let your bull be of the ſame country with your cow, for a mixed breed is not reckoned to be ſo good.

The cow ought to have a broad forehead, black eyes, large clean horns, her neck long and thin, a large deep belly, thick thighs, round legs, ſhort joints, a white large deep udder, having four teats, and her feet large. As for the ſize of your cows, as of all other cattle, it muſt be ſuited to the goodneſs of your land, though the largeſt commonly give the moſt milk: and whether you deſign them for breed, fattening, or the dairy, let them be ſuch as come off a worſe ground than your own, if poſſible. The beſt time to breed calves is from three years old to twelve. *See the article* CALVES.

For a fortnight or three weeks before a cow calves, put her into good graſs; or, if it be in winter, give her hay; and be ſure to keep her in the houſe the firſt day and night after ſhe has calved, and let a little of the cold be taken off the water which you give her: the next day, if well, and ſhe be well cleaned, turn her out about the middle of the day, and take her in two or three nights more, giving her water a little warmed every morning, before you turn her out. *Mortimer's Huſbandry, vol.* I. *p.* 225.

COW-LEASE, paſture, or meadow-ground, kept for feeding of cows.

COWHERD-MILK, implies milk received from the hands of the cowherd, a perſon whoſe office it is to attend upon, and look after, the herd of cows in places where they run in common.

COWL, a term uſed in ſome counties of England to ſignify a tub.

COW-PARSLEY, the name of a plant common in paſture grounds, and of which cows are ſaid to be very fond. This plant ſhould be rooted out of all paſtures, for it is one of the moſt early plants in ſhooting, ſo that by the beginning of April its leaves are two feet high. The ſeeds of this plant ſpread greatly over the ground, and

and as the roots are perennial, ſo they are often very troubleſome weeds to deſtroy.

COW-PARSNIP, *wild parſnip*, *meadow parſnip*, or *madrep*, the name of a weed that grows to near three feet high. The ſtalk is round, furrowed, and hollow. The leaves proceed from a large membrane or ſheath. They grow on long hairy ſtalks, and are divided and downy. The flowers grow in large umbels, are white, and conſiſt of five irregular petals: two oval, ſtreaked, compreſſed ſeeds, ſurrounded by a wing, ſucceed each flower.

COW-WHEAT, by ſome called *fox tail*, is a pernicious weed in many countries. Its ſeed is ſomething like wheat, and, according to Cluſius, ſpoils the meal with which it is ground, by giving it a dark colour, and a bitter taſte: though Mr. Ray ſays he could never perceive any diſagreeable reliſh in the bread with which it was mixed. Mr. Miller ſays it is a delicious food for cattle, particularly for fattening of oxen and cows, and that it may be worth while to cultivate it for that purpoſe.

Its ſeeds ſeldom grow the firſt year, unleſs they chance to be ſown, or ſow themſelves, in the autumn, ſoon after they are ripe.

CRADLE, a part often added to a ſcythe, the better to gather the corn, when low, into ſwarths, when it is mowed.

CRAGG, *cragge*, a name given in Suffolk to the remains of marine ſhells, of various kinds, and in which the greater part of the Britiſh cliffs abound.

This is a very excellent manure for cold, wet, or clay land; ſo that every farmer would do well to ſearch his grounds, in order to know whether he is, or is not, poſſeſſed of this treaſure, which will inſure him of very large crops of corn, though his lands were before worn out by continual labour.

CRAKE, a name given in the northern counties to the crow.

CRAKE-NEEDLE, the ſhepherd's needle; or rather the ſeed-veſſels of it.

CRANE's-BILL. *See* CROWFOOT, CRANE's-BILL.

CRAP, a name given in ſome parts of England to darnel; and in others to buck-wheat.

CRATCH, or *critch*, a rack.

CREAM, the unctuous, or oily part of milk.

CUBBITTING, a vice to which ſome horſes are ſubject; conſiſting in their catching hold of the manger, ſucking in of the air, and ſwallowing it down in gulphs, till they are often ſo full that they are ready to burſt. Some do it only on their collar reins, and ſome on every poſt and gate they come at.

This vice is more common in London than any where elſe, and may either come upon horſes from very low feeding, whilſt they are young and have appetites, or, perhaps, by ſtanding much at the crib while they are ſhedding their teeth; for then their mouths are hot, and their gums tender and itching, which may readily make them ſuck in the air to cool their mouths: but young horſes are the more apt to imbibe this ill habit when they ſtand next thoſe that do it, for young horſes often follow others. Horſes addicted to this vice are but of ſmall value; they drop a great part of their food unchewed, which makes them almoſt always look lean and jaded, with a ſtaring coat, and conſequently few of them are able to endure much labour; beſides their being frequently ſubject to the gripes, and other diſorders, owing to their continual ſucking in the air. There is no method yet known that has proved effectual in the cure of this vice. *Gibſon on Horſes*, *vol.* I. *p.* 40.

CRIBBLE, coarſe meal, or that but one degree better than bran.

CROFT, a ſmall field or incloſure. In the northern counties it is uſed as a ſmall cloſe or incloſure, one end of which contains the dwelling-houſe and kitchen-garden.

CRONES, old ewes.

CROP, the produce, or the quantity of corn, graſs, &c. growing on any parcel of land.

CROSS-TINING, a method of harrowing land, conſiſting in drawing the harrow up the interval it went down before, and down that which it was drawn up.

CROTCH, a hook.

CROW, an iron bar, with a claw at one end, uſed as a lever, and for making holes in the ground, &c.

CROW-FOOT, or CRANE's-BILL, the name of a perennial weed common in paſtures. The leaves are divided almoſt to the middle, uſually into ſeven parts. The ſtalk commonly divides into two branches, and each of theſe into two more. From the corner of each diviſion comes a flower-ſtalk, ſupporting two large blue flowers; conſiſting of five roundiſh, intire petals, ſucceeded by a long ſeed-veſſel, reſembling a crane's-bill. This bill-like ſeed veſſel is thick and rough, but not ſo long as in ſome other plants.

CROWS. *See the article* ROOKS.

CROWN-SCAB, a diſeaſe in horſes, conſiſting in an humour that breaks out round the coronet, of a very ſharp and itching nature, and attended with ſcurfineſs. Sharp waters prepared with vitriol are generally uſed for the cure of this diſorder: but the ſafeſt way is firſt to mix equal parts of marſhmallow ointment and yellow baſilicon together, ſpreading the compoſition on tow, and laying it all round the coronet. A doſe or two of phyſic may be very proper to carry off the humour. *Bartlet's Farriery*, *p.* 296.

CUCKOW-FLOWER. *See the article* LADIES SMOCK.

CUCKOW-LAMBS, a name given in Hertfordſhire to ſuch lambs as are yeaned in April or May, becauſe they fall in cuckow time. They are generally either the lambs of very young, or very old ſheep, and occaſioned by their taking ram very late in the ſeaſon. Theſe lambs are uſually of the ſmalleſt ſort, and therefore both ewe and lamb ſhould have the beſt of keeping, in order to fatten the lamb for the butcher; for ſuch diminutive lambs are improper to be kept for ſtore-ſheep. Beſides, as theſe lambs are yeaned later than ordinary, it is very likely they will meet with green meat ſufficient to fatten them apace, and come in ſeaſon to be ſold for the more money, as they are of the youngeſt ſort, and fatted late. *Ellis on Sheep*, *p.* 79.

CUCKOW-SPIT, a kind of frothy ſubſtance frequently found on plants, containing one or two inſects.

M. Poupart tells us, that as ſoon as the little creature comes out of its egg, it haſtens to ſome plant, which it touches with its fundament, and faſtens there a drop of white liquor full of air; it drops a ſecond near the firſt, then a third, and ſo on, till it covers itſelf all over with a ſcum, or froth; this froth defends it from the heat of the ſun, and alſo from the attacks of the ſpiders, which would otherwiſe devour it. Mr. Liſle is of opinion, that this froth is nothing more than the nightly dew which

falls upon the fork or joint of the plant, and which the little insect, with its proboscis, as with a pair of bellows, works into froth.

CULMIFEROUS *Plants*, such as have a smooth jointed stalk, and their seeds are contained in chaffy husks.

CULTIVATION, the art of improving soils, and forwarding or meliorating the produce of the earth, by manual labour, manure, &c.

CULTIVATOR, a name given by foreign husbandmen to instruments invented for stirring the earth, on the principles of the New Husbandry. These instruments are generally called in England horse-hoes. We shall here give a description of those invented by Messr. de Chateauvieux and de Villiers, and describe those invented in England under the article horse-hoe. *See* HORSE-HOE.

Description of M. de Chateauvieux's *single* CULTIVATOR.

M. de Chateauvieux, having remarked the good effects of his plough in stirring the alleys between the rows of corn, rightly judged, that the instrument we are now going to describe, which is much lighter and simple in its make, would answer the same end; or at least that it might be used alternately with the plough, employing this last only when a greater quantity of earth is to be turned up towards the rows of corn: "for, says he, it is to be observed, that the cultivator hardly changes the situation of the earth, but divides and breaks it in the place it is in, so as to render it loose and light, and fit for the roots of plants to penetrate with ease. This instrument, like a miner, works chiefly under ground, where it cuts the earth, divides its particles, raises it up, and lightens it. It has this farther advantage, that one horse is sufficient to draw it. The cultivator, Plate VII. is composed of a beam, AB. Fig. 1. the handles CD, and the share EF, which is more particularly represented in Fig. 2, 3, 4, 5, and 6.

"The beam AB is three feet and a half, or four feet long. Its diameter ought not to exceed three inches at most; and, if it be square, the edges should be rounded off. It should be pierced with mortises under the letters G, H, in order to let through the cross staves I, L; in the same manner as in the fore-carriage of the plough; and is fixed by the keys K, M, or the pin *a*, *b*. The middle of the handles should be exactly opposite to the beams; that is to say, the space between them should be equal on both sides. These handles should be made slighter than those of the plough before referred to, and they should be fixed to the beam by a tenon in a mortise, riveted at N, and supported behind by the prop P.

"The end A of the share, Fig. 3. and the two fins B, C, are made flat. The crooked handle ABC, Fig. 4, should be triangular, and somewhat sharp before, to answer the end of a coulter, as in Fig. 2, and 5.

"This share is to be let into a groove cut in the under part of the beam, as represented in Fig. 7, and 8; and fastened there by a single ferrule, as in Fig. 9. If it should cut too deep, that may be remedied by altering the position of the wheel, as in the plough, or by inserting a very small wedge *g*, Fig. 10, between the handle of the share and the beam. If it does not cut deep enough, that wedge must be inserted, as at *h*, Fig. 11, at the other end of the handle.

"When this instrument is used, the beam before described is to be substituted in the place of that of the plough, which is to be taken off. The two cross staves I, L, Fig. 1, of the fore carriage of the plough, are then run through the mortises G, H, of this beam, which is thereby fixed to that fore-carriage.

"This cultivator is very easily guided: the ploughman may hold it upright, or incline it to the right or left, just as the intended ploughing may require. The share and its handle enter so deep into the earth, as to be quite buried in it, if a deep ploughing is intended to be given: and in that case the tail A of the beam touches the ground. Though the share is but small, it stirs the earth at least a foot round it. Its point should be of steel, and somewhat inclined towards the earth.

"The share of this instrument, like that of the plough, may be brought as near as one pleases to the rows of corn, by placing the beam accordingly in the frame."

Description of M. de Chateauvieux's *double* CULTIVATOR.

"This instrument, Plate VII. Fig. 12, 13, and 14, has two shares. It has a beam AB, and the shares CD, EF, Fig. 13, which being exactly like that of the single cultivator, I have only to point out wherein these instruments differ. The beam of this should be ten or twelve inches longer than that of the other. It has likewise two mortises more, under the letters G and H, to let through the cross staves EK, IL, which bear the handles MN, OP, of the shares. The cross staves EK, IL, are riveted permanently to the beam: the handles MN, OP, are moveable upon the cross staves, to which they are fastened by the keys R, S, Q, T; so that the shares may be set at a greater or less distance from each other, according as the quality or situation of the ground may require to allow.

"This instrument stirs the earth extremely well, and does a great deal of work in a little time. Each share being about fifteen inches wide at AC, BD, Fig. 14, and the distance between them from A to B, Fig. 14, being about four inches, or, upon occasion, six; and the earth being stirred about two inches on each side beyond the extent of the utmost fins of the shares; each cut of this cultivator stirs about two feet breadth of ground. This double cultivator requires two horses, unless the soil be very light; in which case, I fancy one may do, tho' I have not yet tried it.

"If one had a mind to fix a coulter in the middle of the beam, just before the shares, I see no inconveniency that could arise from thence, provided it be a very light one.

"The way to use this cultivator is to fasten it to the fore-carriage of the plough, by running the two cross staves V, X, Fig. 13, through the beam A, B.

"I would particularly recommend not to make the wood work of this cultivator too thick or heavy, and therefore by no means to exceed the dimensions I have given: for the lighter these instruments are, the more easily they are managed both by men and cattle."

Description of M. de Chateauvieux's CULTIVATOR, *with two Mould-boards.*

"If, says M. de Chateauvieux, I could have imagined,

ed, that my propoſing for the uſe of the New Huſbandry, ſome other inſtruments beſides the plough, properly called, could have been looked upon as either ſo expenſive or ſo troubleſome as to diſcourage people from practiſing that huſbandry, I ſhould not, by any means, have thought of communicating them to the public.

"But why ſhould not agriculture enjoy the ſame advantages as almoſt all great manufactories, in which every uſeful diſcovery and improvement, either to perfect the manufacture, or to fabricate it in leſs time and with leſs expence, is readily adopted?

"It is with a view to facilitate the various labours of cultivation, to execute them better, more ſpeedily, and with much leſs expence, that I have introduced the uſe of my new inſtruments in the culture of my own lands. If others think proper to do ſo too, they will enjoy the ſame advantages. I offer them not as things abſolutely neceſſary, for the plough alone may ſuffice, but as things of which I have experienced the good effects during the years 1753 and 1754, and which, for that reaſon, I think it incumbent on me to recommend to thoſe who adopt the New Huſbandry.

"The cultivator with two mould-boards differs from the ſingle cultivator before deſcribed, only in the two mould-boards which I have added to it, one on each ſide, and which are repreſented in Plate VII. Fig. 15 A, C, E, H, is the mould-board on the left-hand ſide of the plough; and B, D, G, H, the mould-board on the right-hand ſide. The whole of this Fig. 15, repreſents an entire and a perſpective view of the ſhare and mould-boards.

"The mould-boards are made of plates of iron, either caſt or hammered, about the twelfth part of an inch thick, which is ſufficient to reſiſt the preſſure of the earth. Thicker plates than theſe would render the ſhare too heavy, and it would be much more difficult to give them their proper bent.

"The two mould-boards join to the handle at HL, and lap about an inch one over the other; or elſe they are faſtened together by rivets. They form, in that part, an angle E, H, F, of ſomewhat leſs than ninety-degrees, which is ſufficiently acute to ſerve inſtead of a coulter: though a coulter may alſo be uſed upon occaſion, by placing it a little more forward.

"From the lower part L of the handle, the mould-board ſhould paſs underneath the fin L, G, of the ſingle ſhare, and follow the direction of that fin, as at G; being let in beneath, about an inch and an half, according to the pointed line LG, and firmly riveted by three ſtrong rivets.

"The hind part of the mould-boards is fixed and ſupported by the ſtay F, to which they are ſtrongly riveted. This ſtay muſt have exactly the ſame bend as the mould-board.

"Behind the lower part of the handle is another ſtay, M, N, quite cloſe to it, and about two inches below the top of the mould-boards, to which it is riveted at both ends. This ſtay helps to keep them firm: but its chief uſe is to prevent their being raiſed up by the preſſure of the earth againſt their extremities A and B, which would throw their common angle H too forward, and miſplace the ſhare.

"The proper ſlope of the mould-boards cannot be ſo well deſcribed by words, as it may be conceived by the figure, which repreſents at F the convex inſide of the one, and at Q the concave outſide of the other. The diſtance to which the earth is turned over, when the cultivator opens it in order to make a large furrow, depends on the degree of this bending, and the ſpace between the two upper extremities of the mould-boards E, F.

"The hind-moſt part of the mould-boards is cut ſloping at C and D, almoſt in a ſegment of a circle. This ſhape helps to effect a greater diviſion of the earth.

"The plate of iron, before it is bent, ſhould be cut nearly in the ſhape of Fig. 16.

"The ſize of the mould-boards, as well as their proper bending, depends a little upon the quality of the land intended to be cultivated. I have found that, for light ſoils, they need not be bent quite ſo much; ſo that the diſtance from C to D, Fig. 15, may be twelve or thirteen, and even fifteen or ſixteen inches. This ſame cultivator may likewiſe be uſed in ſtiff lands.

"Nothing hinders making theſe mould-boards two or three inches longer, from B to G, and from E to H; or varying ſome of their proportions, as the huſbandman may think beſt.

"This ſhare with the mould-board is fixed to a beam, as in the ſingle cultivator, Fig. 1, where it is faſtened to the fore carriage, by the croſs ſtaves I, L.

"If this deſcription does not convey a ſufficiently clear idea of the ſhape and proportions of this cultivator, I will anſwer for its ſucceſs when uſed. I deſcribe it after one of the ſame kind, which I have made uſe of for two years paſt with very great ſucceſs."

Directions for uſing the CULTIVATOR, *with two Mould-Boards, by M. de* Chauteauvieux.

"This cultivator opens the main furrow in the middle of the alley, by turning the earth over on both ſides at the ſame time; and I have found by experience, that as much work is done by that means, by one turn of this inſtrument, as could be done by two, and frequently three turns of the common plough, and that without uſing a greater number of cattle. I muſt now prove this propoſition; though I am perſuaded that it will eaſily be allowed by whoever only caſts an eye upon Fig. 15, Plate VII. which repreſents the ſhare of this cultivator." *See the article* ALLEY.

Deſcription of a CULTIVATOR *invented by M. de* Villiers.

"This inſtrument is compoſed of a ſhare, Plate VII. Fig. 17, the two fins of which are eight inches, and a half aſunder at their extremities *a*, *b*. The ſocket *c*, which is between the two fins, projects ſome inches, and the hollow in it is three inches long, and one inch wide. It does not deſcend ſo low down as the fins, to prevent its touching the earth. The length of this ſhare, from the point *d*, to the extremity of the fins *a* or *b*, is from 12 to 13 inches. At the diſtance of five inches from the point *d*, is a hole *e*, into which is inſerted the crooked point *f*, of the iron ſafeguard, Fig. 18, which is uſed in ſome countries in order to faſten the ear to the ſhare of the plough. Upon the ſhare is placed a ſmall triangular ear *h*, Fig. 20, 21, and 22, ſomewhat concave at bottom, that the two ſmall ears may join exactly to the ſhare at about an inch diſtance from the edge of the fins.

This ear is about two inches and a half high at *a*, Fig. 21, and is faſtened firmly to the ſhare by a double and angular ſafeguard, which covers its edge as far as *b*. It is fixed at one end by its point, which enters into the hole *e*, Fig. 17, in the ſhare, and by four ſmall pins faſtened to the ear. Fig. 18 and 19 repreſent this ſafeguard. The double ear is faſtened at its other extremity, by the ſheat or upright piece, *e*, *g*, Fig. 21, which paſſes through the ground-reſt of the hinder part of the ear, and beam, and by a piece of iron *c d* bent in a right angle. This piece of iron covers the fore-part of the ſheat, and reſts upon the tail of the ear, againſt which the beam preſſes it very tight, by means of a wedge *e*, driven into the ſheat. The piece *c d* may likewiſe ſerve to fix two mould-boards from *g* to *c*. It is nine inches high. *f* is another ſheat or upright piece, which joins the beam to the ground-reſt, to add to the ſtrength and ſolidity of the inſtrument, which is increaſed alſo by the lower part of handles being fixed in the ground-reſt at *i*, and traverſed by the beam at *k*."

M. de Villiers, in a letter to M. Duhamel, gives the following account of his manner of uſing this cultivator.

"Finding it impoſſible to plough my alleys well when they were but three feet, or three feet and half wide, without greatly damaging the rows of corn bordering upon them, I reſolved to make them four feet wide, and took particular care to have the rows drilled very ſtrait: but even then I found only one way of ploughing them well, which is to open the firſt furrow ſo near to the bed, that the next furrow within that may come within two or three inches of the neareſt row of plants in the bed; turning over the earth of theſe furrows towards the alley. After two or three ſuch turns of the plough, the ploughman will be ſure not to make any miſtake. It is of great importance to cut this firſt furrow, by which all the others are directed, quite parallel to the rows. The reſt of the work will then go on regularly, and without any of that confuſion which would be capable of giving many people a diſlike to the new huſbandry. My horſes were led by hand, till they were ſufficiently accuſtomed to this work; but that was neceſſary only for the firſt furrow, which they afterwards follow of their own accord, ſo that the reſt of the alley is ploughed with great eaſe.

"The earth of the ſecond furrow, which is cut very near to the rows, is turned over in the ſame direction as that of the firſt, that is to ſay from the bed.

"The third furrow is ploughed the contrary way, and the earth is then turned over towards the rows, ſo that the laſt furrow is filled up by this ploughing, and a conſiderable quantity of well divided earth is turned over to the rows, for the plants to extend their roots in in the ſpring.

"I then continue ploughing in the ſame direction, cutting the furrow that is turned over towards the rows as thick as poſſible, till the whole alley is ploughed almoſt cloſe to the oppoſite bed, when, by turning over one large furrow on that ſide, the ſmall one cut there at firſt is filled up. By this means, the ſpring hoeing is completely executed.

"I begin the ſecond ploughing on the ſide where I ended the firſt, turning the earth over that way, which is the contrary to what was done before. When I come to the other ſide of the alley, I leave there, as was left before on the ſide I now begin at, the breadth of a ſmall furrow, which I do not plough, but over which I turn the earth of my laſt furrow.

"I think this ſecond hoeing may be deferred, when the ground does not produce many weeds: and in this caſe I perform it with the cultivator, which I bring almoſt cloſe to the rows.

"After thus uſing, ſometimes the plough, and ſometimes the cultivator, according as the condition of the ground ſeems to require, I finiſh all my hoeings by putting two horſes to the cultivator, and drawing it once or twice through the middle of the alleys, becauſe it cuts four or five inches deeper than the plough."

M. de Villiers adds, that he could not always turn the earth over towards the rows, as M. Duhamel directs, becauſe the wheel of his plough, getting too deep in the middle furrow, altered the direction of the ſhare. To this M. Duhamel obſerves, that he himſelf met with the ſame difficulty, and found no other way of remedying it, but by opening a ſmall furrow near the rows, by the help of which he turned the earth over towards the alleys, and then filled up that furrow immediately; taking care at the ſame time to turn the mould over towards the roots of the plants, ſo as to earth them up as much as poſſible. I am glad, adds he, that I have had this opportunity of giving M. de Villiers's method, becauſe I think it a good one, and believe it will be of great ſervite to ſuch as may be inclined to practiſe the new huſbandry." *Duhamel's Cultures des Terres, tome* I.

The cultivators invented by theſe gentlemen abroad, are many of them ingeniouſly contrived, but are by no means proper to be ſubſtituted in the room of the hoe-plough, becauſe they do not turn the ſoil, and expoſe a new ſurface to the air as the hoe-plough does, which is an eſſential circumſtance in horſe hoeing. By the expoſure to the immediate action of the air, dews, froſt, &c. the ſoil is pulverized to a much greater degree, than when it lies at any depth, and is much more impregnated by the nutritious particles in the atmoſphere, by which it is enriched ſo much, as to produce conſtant ſucceſſive crops of corn, with little or no manure, as in the horſe-hoeing huſbandry; but without being thus turned and expoſed, the land acquires no ſuch fertility, as every farmer knows by experience.

M. de Chateauvieux's cultivators, the ſingle one particularly, does not turn the ſoil, but, as he obſerves, goes under ground, raiſing the earth a little, which falls down again in the ſame place, for which reaſon he gave it the name of a miner. Mr. Wynn Baker made uſe of it to hoe his drilled wheat alternately with the hoe-plough, which appears to have been one principal reaſon of his ill ſucceſs in that experiment of horſe hoed wheat. He attributes the failure of his drilled wheat to the narrowneſs of his ridges; but they were five feet broad, which is ſome inches broader than Mr. Tull's, and others ſince, who have ſucceeded in this culture. He likewiſe limited his tillage to four hoeings, though he found his crops declining; whereas had he given his wheat two or three more hoeings, which coſt him but one ſhilling each per Engliſh acre, or ſown ſome light manure upon the rows, as Mr. Tull directs in ſuch caſes, theſe would have kept up the fertility of his land, though he had continued to make uſe of the cultivators.

CULTUR, or rather *Coulter*, the piece of iron that cuts the earth before the plough-ſhare. *See the article* PLOUGH.

CULTURE, the art of cultivating, improving, or meliorating the ſoil.

Fig. 1. A Chese Press.

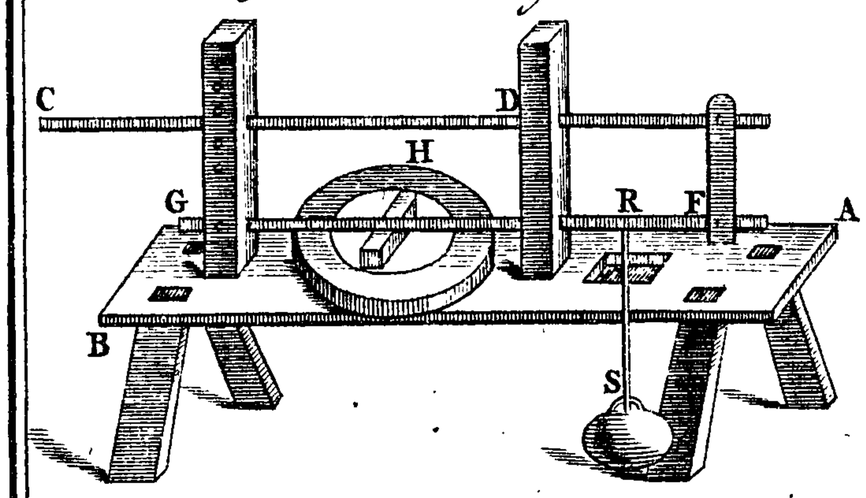
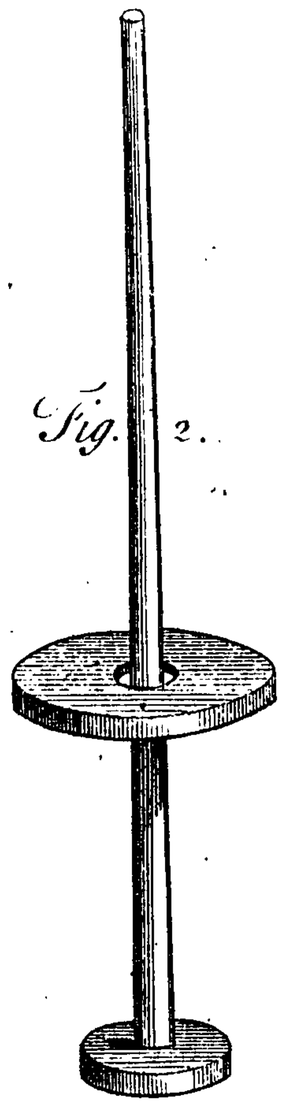


Fig. 2.



Churn

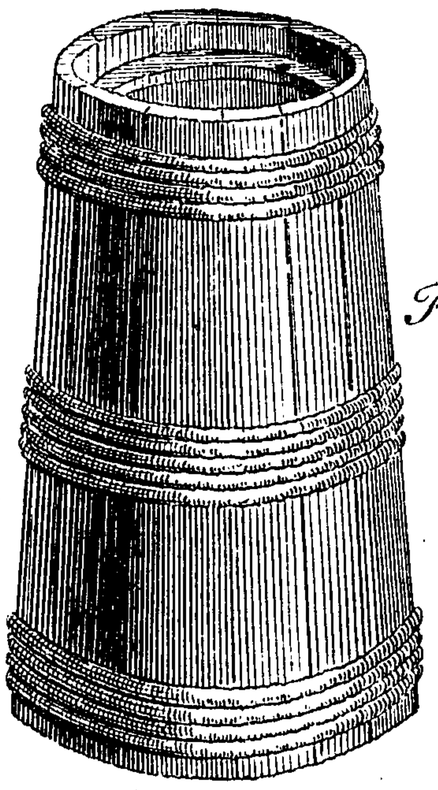


Fig. 3.

Fig. 4.

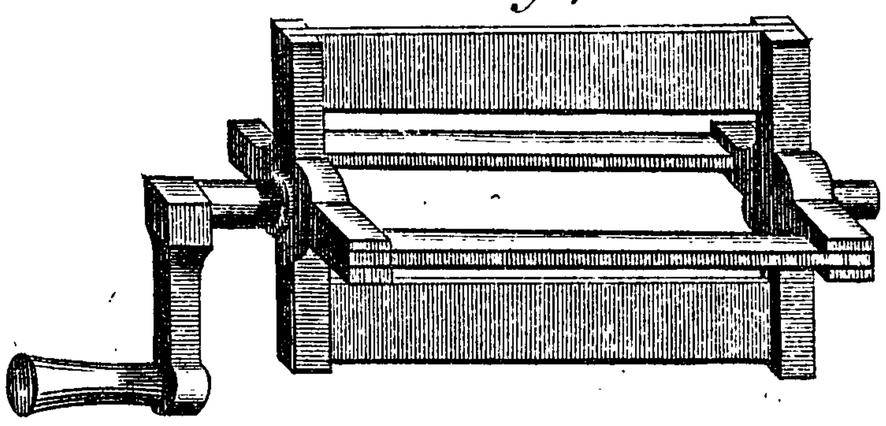


Fig. 5.



Fig. 6. Churn.

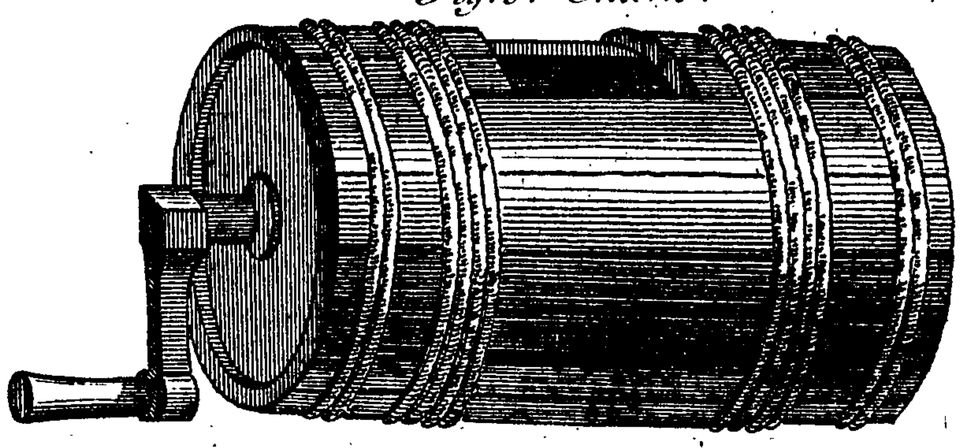


Fig. 7.

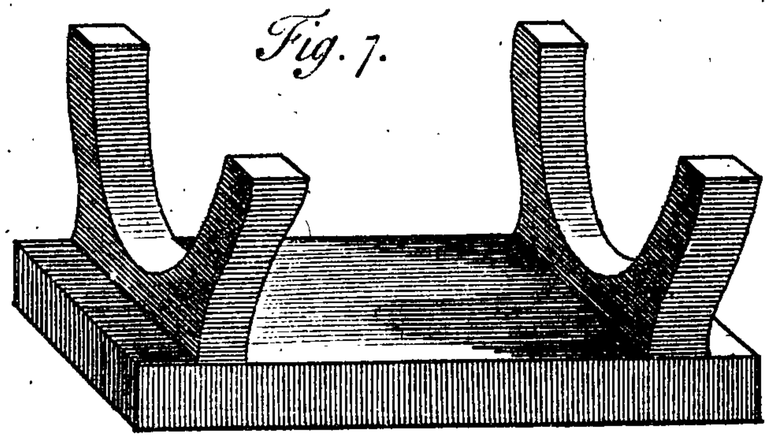


Fig. 8. Cider Mill.

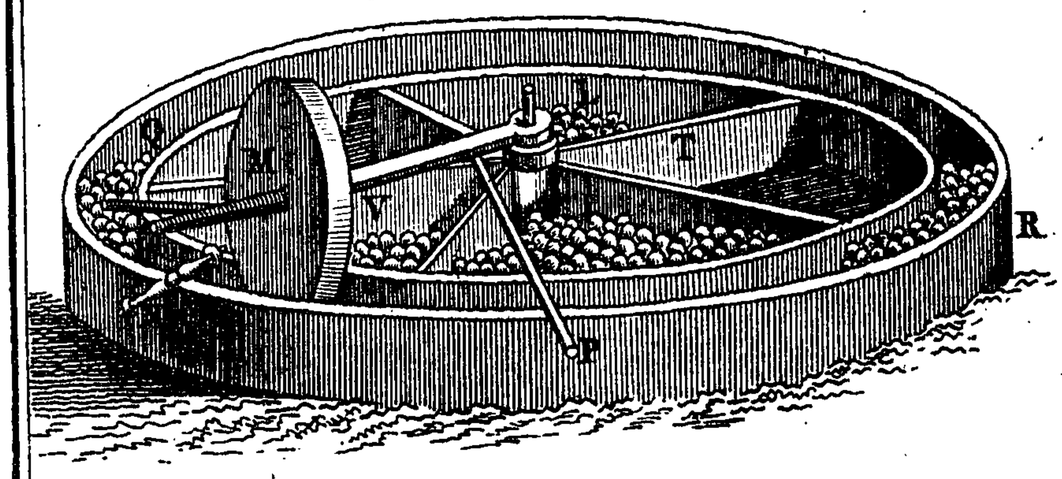


Fig. 9. Small Cider Press

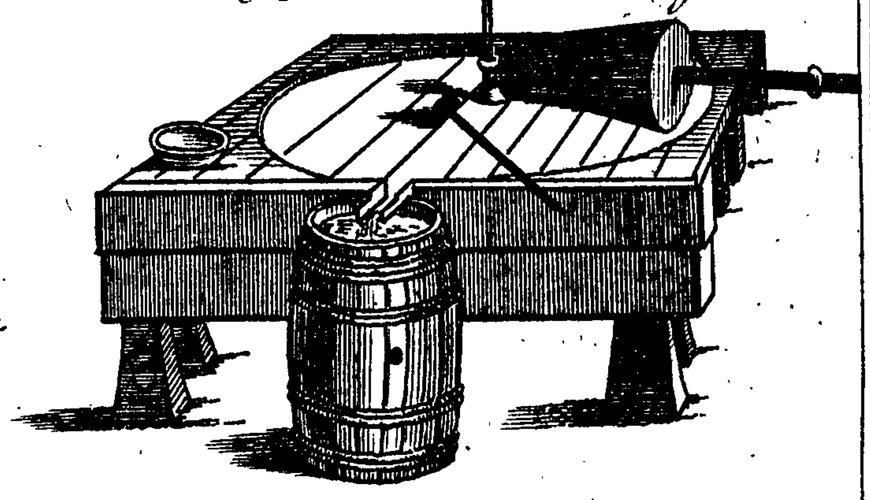


Fig. 10. Cider Press.

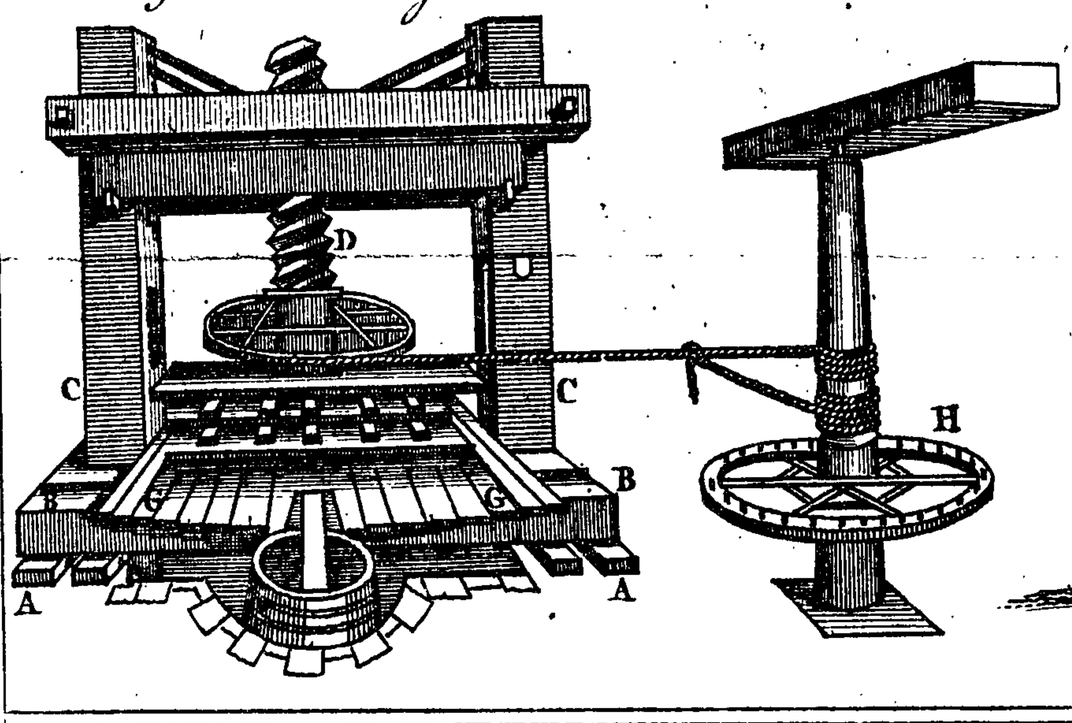
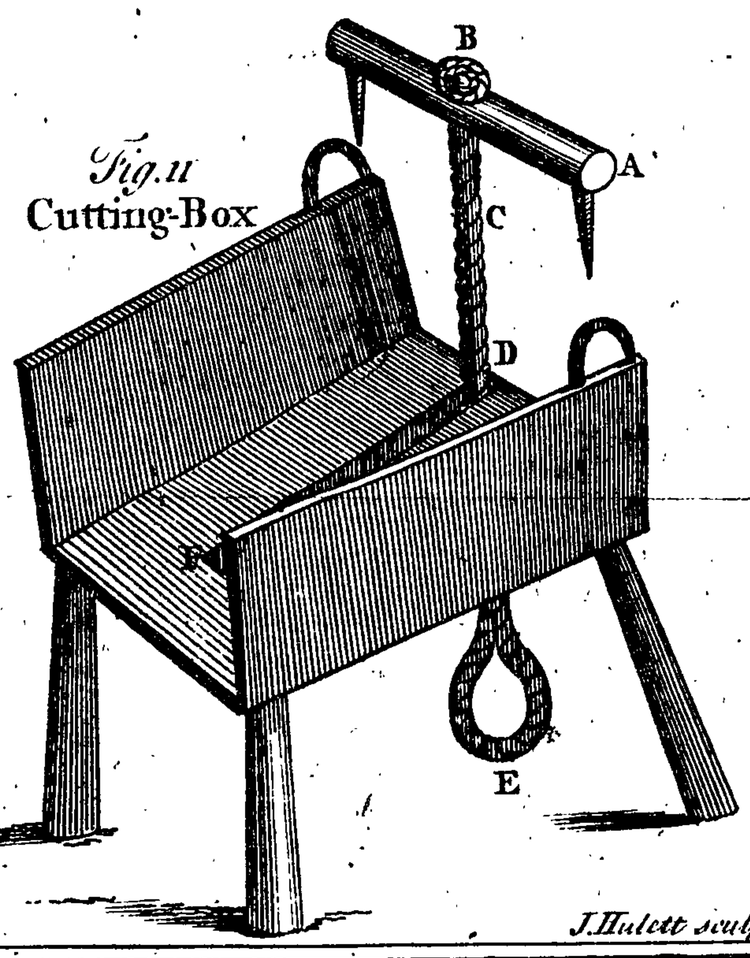


Fig. 11
Cutting-Box



J. Hulett sculp.

CULVER, a pigeon.

CURB, an iron chain faſtened to the upper part of the branches of the bridle, in a part called the eye, and running over the beard of the horſe.

CURB, is alſo the name of a diſeaſe of horſes, conſiſting in a ſwelling at the junctures of the bones on the hind part of the hock, forming a pretty large tumour over the back part of the hind leg, attended with ſtiffneſs, and ſometimes wih pain and lameneſs.

A curb proceeds from hard riding, ſtrains, blows, or kicks. The cure at firſt is in general eaſily enough effected by bliſtering repeated two or three times, or even oftener. If it does not ſubmit to this treatment, but grows exceſſively hard, the quickeſt and ſureſt way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing ſeveral lines in a penny form manner, pretty deep; and then to apply a mild bliſtering plaiſter or ointment over it. This method will entirely remove it. *Bartlet's Farriery, p.* 262.

CURRY-COMB, an iron inſtrument full of ſmall teeth, uſed for currying horſes.

CUSPATED *flowers*, thoſe whoſe petals or flower-leaves end in a point.

CUTTING-BOX, a machine for cutting fodder, as ſtraw, hay, haum, &c. into ſmall pieces, commonly called chaff, for the uſe of cattle.

We have given, on plate VI. Fig. 11. a cut taken from the Muſeum Ruſticum, Vol. VI. page 10, of an improved cutting-box. The improvement conſiſts in what the inventor calls a preſſer, which is a piece of wood as long as the box is wide, with three iron tongues in it, like thoſe of a hay-fork. Theſe tongues are put into the bundle of hay or ſtraw to be cut; and by means of a rope fixed thereto, and extending under the box, the preſſer is forced down by the left foot of the cutter, and conſequently the bundle kept tight. By this means the chaff is cut with great eaſe; and, after every cut, the operator riſes his left-foot, puſhes his ſheaf or bundle forward with his left-hand, then preſſes it down again with his foot and takes another cut. In this manner, he continues working, till the whole bundle is reduced to chaff.

This deſcription will be very eaſily underſtood by inſpecting the figure above referred to, where A is the preſſer, B a large knot at the end of the rope, which faſtens it to the preſſer. C the rope, D F the ſlit in which the rope moves, as the cutter puſhes the bundle forward. E the loop in which the cutter puts his left-foot. F the box to contain the hay, ſtraw, &c. The knife is not delineated in this figure, as the manner of placing it is ſufficiently kown.

A correſpondent of the editors of the Muſeum Ruſticum tells us, that he never gives his horſes any pure corn, but always makes uſe of his cutting box, in which his ſervants cut his horſe-meat, which conſiſts of unthraſhed oats, tares, peaſe, or beans. They cut off the heads where the corn lies, and take beſides a cut or two of the ſtraw to mix with it. This he gives to his horſes inſtead of corn, it being a very nouriſhing food, and of which they are very fond. Nor is there any danger of their being ſurfeited with it, which they often are with pure corn; many of their diſorders ariſing from their being over-fed.

"I cannot, continues he, enough commend the uſe of a cutting-box, though I am perſuaded the ploughmen will endeavour to prepoſſeſs their maſters againſt it, becauſe the cutting of the horſe-meat is pretty tough work, and they do not, in general, love to do more than they can help.

"When oats, beans, peaſe, or tares, are intended to be thus cut for horſe-meat, it is beſt to mow them before they are quite ripe, as by that means fewer of them will be loſt by ſhaling, and the ſtraw, or ſtalks, will be of a better quality, and more nouriſhing for the cattle.

"Care muſt, however, be taken that the crop be well dried before it is houſed, leſt it heat in the mow, and take damage, if not ſet the barn, or ſtack, on fire." *Muſeum Ruſticum, vol.* I. *p.* 258.

CYDER, or *Cider*, a liquor made from the juice of apples, expreſſed and fermented.

A Herefordſhire planter has given us the following method of making cyder in that county, which has been ſo famous for this liquor.

"The worſe, ſays he, the apple is for the table, the better it is, in general, eſteemed for cyder, ſuch as grow all over this country, and are, in a manner, wild, harſh, and crabbed to the taſte. Theſe go under various names, as the redſtreak, the white and green muſts, the gennet-moyl, the ſtocking apple, the ſummer and winter fillets, &c. &c. of all which I prefer the firſt, provided it is a good ſort, which is not always the caſe, particularly in ſome parts of Worceſter and Glouceſterſhire, where they grow in great plenty.

"I have long laid down from experience, the beſt miſtreſs, that, firſt, the more red an apple is in its rind, the fitter it is for cyder; that is to ſay, if it is at all fit; for I have ſeen an apple of a very deep red, by ſome called ſopſy-wine, quaſi ſopped in wine, which was worth nothing in this intention.

"Secondly, that the paler the rind, the worſe the juice.

"Thirdly, I have found it a maxim in general true, that a ſweet apple with a tough rind will always yield a good vinous liquor.

"Fourthly, The more yellow the fleſh of the fruit, the better and finer coloured will the cyder be.

"Theſe few maxims, not too ſcrupulouſly adhered to, have been of great ſervice to me in life; for though I have a high opinion of them, I do not abſolutely rely on them. There is no rule ſo general, but an exception may be made to it; but a man of reflection, with a few well-founded rules, will ſeldom be at a loſs how to act in this, or in any other caſe.

"I ſeldom ſuffer my apples to be gathered till they begin of themſelves to drop from the trees; nature then tells me they have, for the moſt part, acquired a proper degree of maturity.

"Great care is taken in the gathering of them, for fear they ſhould be bruiſed in the operation; and this I have always found a very neceſſary precaution.

"As they are gathered I have them ſorted, according to the ſeveral degrees of ripeneſs they are of, making, in general, three ſorts, which a little experience eaſily teaches to ſeparate properly, the difference being apparent enough at firſt ſight.

"As faſt as they are gathered and ſorted, they are carried under a ſhed prepared for that purpoſe, and laid in large heaps to meliorate: this practice I cannot enough recommend, as being of great ſervice to the liquor, improving its quality, and making it keep, without

out compariſon, better; and all this is cauſed by a little ſweating in the heap.

"Yet, good as this practice may be, ſome avaricious planters cannot be induced to adopt it, becauſe, ſay they, the apples freſh from the tree will yield better; as, of theſe laſt, about twenty buſhels will give a hogſhead of cyder; whereas, of the other apples, which have been heaped, it will take about twenty-five to make the ſame quantity.

"I ſuffer my apples to lie in the heap a longer or a ſhorter time, according to the nature of them, ſuch as are harſh and ſolid requiring to lie longer, by ſeveral days, than thoſe that are mellow and pulpy; and the degree of maturity the apples had attained before they were heaped, makes alſo ſome difference in this reſpect.

"I have already obſerved, that I divide my fruit into three ſeveral ſorts, according to the ſtate of its maturity: I have now to add, that, from theſe three ſortings, I have no leſs than ſix ſeveral kinds of cyder, each different from the other in taſte, flavour, and quality.

"As faſt as the fruit is ground (I need not, I think, mention that I uſed the ripeſt firſt) the pulp is put into a large vat near the preſs: at the bottom of the vat is a tap, through which a conſiderable quantity of the prime vinous juice will run without any preſſing, induced by its own weight only: this produces my beſt cyder; and I always tun it up by itſelf: the pulp is afterwards preſſed in the uſual way. The ſame proceſs is uſed in all the three ſortings of apples; by which means I get, as I ſaid before, ſix ſorts of cyder.

"The firſt runnings from the vat I immediately put into the veſſels in which it is to remain; only, if it happens, by any accident, to be too foul, I ſtrain it firſt. I allow here but a ſmall vent-hole, and when it has done working, I fill the veſſel with ſome of the ſame liquor reſerved for that purpoſe: I afterwards, by degrees, cloſe the vent till it is finally and well ſtopped.

"As to the juice, which undergoes the action of the preſs, I put this, as ſoon as it runs off, into veſſels, where I ſuffer it to remain about thirty hours, according to the ſeaſon, till the fæces are precipitated, or fallen to the bottom; after which I draw it off, and tun it up in the veſſels in which it is to remain, with the precautions, however, above mentioned, when I treated of the firſt runnings.

"The kind of veſſels I uſe, and which I think by far beſt, are upright hogſheads, broader at the upper head than at the bottom; and I often, after my cyder has done fermenting, caſt two or three handfulls of wheat-bran into each veſſel, which ſerves to thicken the head or cream of the liquor, and makes it keep better.

"I am very careful with reſpect to the veſſels into which I put my cyder, always avoiding new ones, if poſſible, as they give the liquor a twang, or bad taſte, and hurt its colour; my uſual way is, to ſeaſon all my new caſks, that I poſſibly can, with ſmall beer, which I uſe in common in my family, though I live in a cyder county; and if I have not an opportunity of doing this, I ſcald them with water, in which a conſiderable quantity of apple-pulp has been boiled.

"If a veſſel is not ſweet, it may eaſily be cured, unleſs very bad indeed, by putting ſome unſlacked lime into it, adding ſome cold water, ſtopping it cloſe, and rolling it about till the noiſe within is no longer heard.

"I have often found it of great uſe towards enlivening the liquor, to ſlice about a dozen ſweet apples into a hogſhead: I am alſo inclined to think it makes it keep better.

"The beſt cyder I ever had was a few years ago, when I put in each hogſhead about three quarts of good wheat, firſt boiled and hulled, ſo as to have, in ſome meaſure, the appearance of boiled rice.

"When I am obliged to put any cyder into a caſk I ſuſpect, and afterwards diſcover it has given the liquor a bad taſte, I cauſe ſome muſtard-ſeed to be ground in a quern with ſome cyder: this mixture, being put into the hogſhead, is often of great ſervice, and reſtores it to its original good taſte.

"Cyder, when it is tunned, is very apt to loſe that fine mild ſpirit which renders it ſo pleaſant and briſk a liquor; therefore great caution ſhould be uſed with reſpect to the vent. The wild, furious, and ungovernable ſpirit ſhould be ſuffered to eſcape; which may eaſily be effected by leaving a ſmall vent open for a few days; after which the barrel muſt be cloſe ſtopped, for if it gets any vent, the liquor will ſtand a great chance of being entirely ſpoilt; on the contrary, if well bunged, though it may be dead and flat at firſt, it will ſoon recover itſelf, maturate, and be fit for drinking. This particular part of the management of cyder is critical, and depends greatly on the temperature of the air, ſo that it is impoſſible to give any abſolute directions about it, as ſomething muſt ſtill be left to be learned by experience, and governed by diſcretion.

"I muſt give one particular piece of advice to ſuch as intend making cyder, which is, that they diligently watch the alterations in it upon every change of weather, as a ſmall neglect, at ſuch times, is often fatal to many hogſheads, and the danger is much greater in ſummer than in winter. There is ſcarcely any diſeaſe incident to this liquor, but what may eaſily be cured by a timely application: if it is only a little inclined to tartneſs, wheat, managed as above-mentioned, will cure it; and the ſame thing is alſo very good to preſerve it, when it is drawn out of one caſk into another: the quantity when the liquor is tart is about half a peck to a hogſhead; I have ſometimes even put a quart more.

"This ſimple remedy will, I ſay, often cure the tartneſs I mentioned; but ſometimes, when it is very thick and ſouriſh, it may be neceſſary to raiſe a new fermentation, to purge off the impurities, and make them ſubſide: this may be ſoon done by bruiſing the fleſh of a few apples to a pulp with ſome of the liquor, and putting the whole into the bung-hole of the veſſel; this will raiſe a ferment, and cure the cyder: when that is over, it will be proper to draw it off into another caſk; and it will alſo be a very uſeful precaution, to put into the laſt mentioned veſſel about a quarter of a peck of wheat, prepared as I have already directed: this will give it new life and ſpirits, and make it keep better, and drink much pleaſanter.

"I have ſometimes alſo uſed another method to cure tart cyder; but it has not always ſucceeded with me; why, I cannot ſay, as ſome people who live not many miles from me, have great dependence on it. Something may depend on their ſoil differing from mine, though this may, to ſome of your readers, ſeem to have a very remote analogy to the caſe in hand. The remedy is, to break half a dozen new-laid eggs, and beat them up, ſhells and all, till they are brought to a frothy oil: this is

is put into the bung-hole of a hogſhead, and, as I am credibly informed, ſometimes proves a very efficacious remedy: it has ſucceeded with me, but not ſo often as to induce me to depend much upon it; I mention it, however, as it may prove of more efficacy with others than it has with me.

"An induſtrious planter will, by the conſtancy of his obſervations and remarks, always have it in his power to cure his own liquor by receipts of his own diſcovering; and for this purpoſe I would recommend, that he be continually making experiments, and that whatever trials he makes, be in various modes and proportions; for the remedy that may be of no ſervice in one form, may poſſibly be very efficacious when altered with judgment, which judgment can only be acquired by experience and obſervation.

"It is to be noticed, that, if the cyder is acid, and at the ſame time clear, it is in a very dangerous ſtate, being but rarely recovered: therefore, in general, when this is the caſe, the cure is ſcarcely worth attempting.

"I have often uſed wheat for the recovery of my cyder in other forms, ſometimes putting about half a peck, under-ground, into a hogſhead for it to feed on; at other times I have made dough of coarſe meal with the bran in it, adding ſome leven, uſing no ſalt, and putting warm cyder, or white wine, inſtead of water, in the mixture: this dough I make into lumps about as large as my fiſt, and thruſt them into the bung-hole of the hogſhead, the quantity being about half a peck of the meal to a hogſhead.

"Many mix different kinds of ſpice with their liquor, particularly ginger, which they think of great ſervice; but I never uſe it now, ſeldom having found any great effect reſulting from it, and being of opinion that it renders the cyder more unwholeſome than it can poſſibly in its own nature be; for though the ginger may not make any very ſenſible alteration in the immediate taſte of the liquor, it muſt, I think, ſtrongly impregnate it with its fiery particles, and thereby greatly irritate the maſs of blood, and inflame the lungs of ſuch as drink any quantities of liquor wherein it has been infuſed: others, however, may differ in opinion from me: I know, indeed, many that do ſo, therefore I only declare my opinion. *Muſeum Ruſticum, vol.* II. *p.* 37.

It is of great importance in the making of cyder, that the fruit be thoroughly ripe. The juices of unripe apples retain their harſh, ſour taſte, in ſpite of all endeavours, and never acquire that racy, mellow flavour, which the ſun only can beſtow. Sweating together in a heap will, indeed, give them an artificial ripeneſs; but this is not equivalent for that which they receive from nature, which though it receives ſome aſſiſtance from the induſtry of man, can never be completely imitated by art.

It ſhould, therefore, be the firſt care of every one concerned in the making of cyder, to let his apples hang upon the tree till they arrive at full maturity. But no certain time can be aſſigned for this: it varies with the nature of the fruit, and the circumſtances of the ſeaſon. Different apples have different times of ripening; and the ſame, according to the weather, change their times conſiderably from one year to another: but ſigns there always are ſufficient to direct the huſbandman. The brownneſs of the kernels, their rattling in the apple, the fragrant ſmell of the fruit itſelf, and its ſpontaneouſly falling from the tree in calm weather, are certain indications, which, in all kinds, may be depended on. It is, however, an uſeful caution in this, as in every other caſe, to err on the right-ſide, and to let the apples hang too long, rather than too little. Summer fruit, indeed, will ſuffer by this method, grow pulpy, dry, and mealy, and afford little or no juice. In every other caſe the rule is good, and in the beſt fruits, moſt. The harſher kinds can hardly hang too long, for they daily mend upon the tree: their juices mellow, throw off their crude and watery parts, and conſequently, as the crude juices leſſen in quantity, the apples improve proportionably in quality. They may hang upon the tree as long as the weather can be expected to continue open: but ſevere froſt ſhould be moſt carefully avoided, becauſe it deſtroys the texture of the fruit ſo much, that even cold water, the only remedy in ſuch caſe, will not reſtore it to its former ſtate: for as all fluids enlarge their dimenſions when frozen, the containing veſſels of all ſucculent ſubſtances muſt be thereby burſt, and this has upon the fruit an effect ſimilar to a bruiſe, or any other cauſe that deſtroys the veſſels, whereby the extravaſated liquors ſoon putrify. From this cauſe it is that the ſtrongeſt foreſt trees are often rent aſunder in very ſevere froſts.

When your apples are fit for gathering, it is eſſential to chooſe dry weather for that purpoſe, for water is a bad ingredient in all vinous liquors, and your fruit ſhould therefore be guarded from it with peculiar care. The wet which adheres to the apples after rain or dew, or even the ſmaller quantity of moiſture which they might contract by falling or lying upon graſs, is ſufficient to impoveriſh your cyder in a ſenſible degree. Gather your fruit therefore in the drieſt day, and in the drieſt part of it, when the dew is thoroughly exhaled, and, of choice, gather it by hand. This method may, perhaps, be troubleſome and difficult in plantations of great extent, and where the trees are very tall: but wherever it can be uſed it is of great advantage, and certainly quits coſt. You then can chooſe your apples, and leave upon the tree thoſe which are not of a ſufficient ripeneſs: you ſave your fruit from bruiſes, and your trees from the damage they frequently receive by violent unſkilful ſhaking.

The gathering by hand is ſo eſſential, eſpecially for winter fruit, which is to be ſweated for a conſiderable time, that it ſhould not by any means be diſpenſed with; becauſe, as every wounded part of an apple will rot in the ſweating, a very great loſs muſt be occaſioned, both in the quantity of the fruit, and in the longer time taken up in wiping and rubbing off every ſpeck of rottenneſs upon each ſingle apple. This laſt labour is indiſpenſible; becauſe, otherwiſe, the putrid taint would ever remain in the liquor. Thoſe who plead the want of time, where a great quantity of fruit is to be preſſed, may be anſwered, that it would be more to their advantage to have only half the quantity of good cyder than the whole of indifferent; and the gathering may certainly be expeditiouſly performed by means of ſtep-ladders. The apples may be put into baſkets, as they are gathered, and thereby be preſerved free from hurt, and the tree will not be injured as the ſupport of the ladders here recommended is independant of the tree. However, for thoſe who will follow the contrary practice, the beſt method is to cover the ground nnder the trees with a ſufficient thickneſs of ſtraw to ſave the apples in their fall, and to lay blankets upon the ſtraw; then, with an eaſy motion, to ſhake the boughs ſucceſſively, removing, at every ſhaking, the ap-

ples already fallen, that they may not be bruiſed by the next. By theſe means all your apples are kept dry, and, for the moſt part, free from bruiſes; and with a little additional care you may alſo, in this method, ſeparate the fruits according to their ripeneſs; for if you proceed regularly from bough to bough, and give each a gentle ſwing, the ripeſt will fall firſt, and the unripe remain upon the tree till more violent motion brings them down.

Windfalls, as they are generally termed, bruiſed apples, and thoſe which have not been well ripened, ſhould not by any means be mixed with the choice fruit; for if they are, it would be in vain to expect good cyder: the quantity of it may indeed be large, but it will always be proportionably bad. This fruit need not, however, be thrown away, excepting only that part of it where the bruiſe appears black and mouldy; for a very little of this would communicate an offenſive taſte to the whole liquor. The reſt will make inferior kinds of cyder; and if care be taken that the windfalls do not lie too long upon the ground, and if keeping cyder be not expected from bruiſed apples, they will anſwer tolerably well: nay, Mr. Newburg tells us, in a letter ſubjoined to Mr. Evelyn's Pomona, that a neighbour of his aſſured him he had made a quantity of very good cyder with windfalls, which he ripened by ſweating them for about a month, that they were beaten off the tree earlier than the ſeaſon when nature would otherwiſe have compleated their maturity; but that all the neighbours of this perſon, who preſſed their untimely fruit as ſoon as it fell, had a crude, auſtere, indigeſted liquor, not worth the name of cyder.

The ſweating of the apples has, however, been made a matter of ſome diſpute. The writer of the 24th letter in the Dublin Society's Weekly Obſervations diſapproves of it for choice ripe fruit, and inſtances his having been informed of ſome curious gentlemen who carried their thoroughly ripe apples directly from the tree to the grinding mill, without any previous ſweating, and obtained from them ſome of the beſt cyder they ever taſted. As to the winter fruits, he thinks it probable that the neceſſity of ſweating them might be removed, by leaving them upon the trees ſomewhat longer than is neceſſary to ripen them; "no reaſon," (ſays he, without having perhaps ſufficiently attended to the benefit which fruit receives from being diſcharged of its watery parts) "hitherto appearing to make us think that this fermentation by ſweating ſerves any other uſe than to increaſe the degree of maturity which the fruit had acquired upon the tree—It is indeed poſſible," continues he, "that it may anſwer farther purpoſes, and diſpoſe the fruit to an eaſier emiſſion of its juices: and as our reaſonings upon nature frequently loſe their way, where experience does not guide them, it is from trials only that we can form a judgment to be depended on: recourſe muſt therefore be had to actual experiments, which in this caſe are eaſy, and will certainly quit coſt: for which ever way the queſtion be determined, ſomething muſt be found very well worth the knowing. Should ſweating anſwer ſome purpoſe not to be attained upon the tree, it will, when once diſcovered, aſcertain the nature, the uſe, and the degree of ſweating: or ſhould nothing of this kind appear, it will correct a practice, which, if it does no good, muſt certainly do miſchief; ſince it is evident to common ſenſe, that if maturity be all that is wanting, it is more perfectly and more naturally attained upon the tree." However, till this is determined by experience, it will be right to continue the practice of ſweating every apple; for as to windfalls, and other hard and unripe fruit, it is out of diſpute, that as they are deprived of natural maturity, they muſt be aſſiſted by art.

Upon the whole, there ſeems in this caſe one rule which may be followed for all fruits, namely, to preſs their juice for fermenting at the time when the fruit itſelf is in the greateſt perfection for eating. Experience teaches us, that there are few apples which do not require time for their being mellowed, before they attain to their higheſt flavour. The golden pippin, for example, is in its greateſt perfection when kept till October; and in favourable years it will retain its flavour and juicineſs even till Chriſtmas, or longer. The nonpareil does not attain its chief excellence till near Chriſtmas, and after that it continues in perfection ſeveral weeks. It is therefore during the time theſe apples continue in perfection, that they are fitteſt to be preſſed for cyder; and the ſame will doubtleſs hold good of the other ſorts, none of which ſhould be preſſed before they have attained their higheſt flavour, nor after they have begun to loſe it. A principal advantage accruing from the ſweating of apples is, that the fruit is thereby deprived of the watery parts of its juice, which would only weaken the liquor; while its pulp yields a greater quantity of the enriched juice after it has been mellowed.

The material points to be obſerved in the ſweating of apples are, that the fruits be ſeparated according to their different degrees of ripeneſs, and that the floor on which they are laid be as dry as poſſible. The more ſtrictly the former of theſe cautions is obſerved, the better it will be; and the more the fruit in every heap is alike in its maturity, the ſooner the ſweating will be over, and the leſs damage will accrue to the ripeſt and beſt apples in the heap. However, if care be taken not to mix any that are very ripe with others that are very green, the injury will not be great: but if this ſhould be neglected, as it too frequently is, either the ripe apples will rot, or the green ones will remain unmellowed; and in either of theſe caſes, the cyder will be conſiderably leſſened in its value. Boarded floors will beſt anſwer the intention of the ſecond caution, becauſe they are drieſt; earthen floors, however, if covered ſome inches deep with wheat, rye, or oat ſtraw, will do tolerably well. It is likewiſe eſſential, for the better preſervation of the apples, that they do not touch the walls or ſides of the ſtore-room in which they are laid to ſweat. To heap them up in the orchard, or any where elſe upon the graſs, or on an uncovered floor where the rains and dews have free acceſs to them, is a ſure way to make the cyder weak and watery, and frequently muſty and ill-taſted.

Sweating being then undeniably neceſſary, at leaſt for unripe, hard, and winter fruit, the huſbandman, who makes a conſiderable quantity of cyder, will find a great conveniency in having near his orchard a building, of which his mill and preſs ſhould occupy the lower floor, and his apples be ſweated in that above, from whence they may be conveyed into the mill by a proper trunk. The duration of the time of ſweating is beſt determined by the ſmell of the fruit, that is, whenever it emits a full ſcent of the apples, they are fit for the preſs. Different kinds require different lengths of time, viz. from eight or ten days, to ſix weeks. The harther the apple is, the more time it wants.

Apples that have laid any time in heaps, are generally covered

covered with a clammy moiſture, proceeding from their ſweating. This ſhould be well wiped off; for it is a watery juice, which would impoveriſh the cyder; and at the ſame time every bruiſed and rotten part of the apple ſhould be carefully cut out, and thrown away, and it ſhould be cleared of its ſtalk; becauſe the former would give a putrid taſte, and the latter too much roughneſs, to the cyder.

The common practice is to carry immediately the apples from the heap where they have been ſweated, to the mill, and then to grind them; but if we attend to the length of time during which they will remain in a ſucculent ſtate after having been ſweated, carefully wiped dry, and properly laid up in a place of preſervation; we ſhall find, that if theſe directions are duly obſerved, the fruit will continue in a perfectly ſound ſtate, and fit to be made into cyder, till it may be convenient for the huſbandman to preſs it: but before he does this, or rather before he ſweats his apples, he ſhould take care to ſort them, or at leaſt all the moſt valuable kinds, and particularly the ſtire, under-leaf, fox-whelp, and golden pippin, which hitherto have not been found to do ſo well in mixtures, as each of them does by itſelf.

The juice of the apples is obtained either by pounding the fruit in a trough, or grinding it in a mill. The former of theſe is leaſt approved, becauſe it is ſo tedious as to ſuit only ſmall quantities, and the work is performed by it unequally, and with waſte; much of the liquor being daſhed out of the trough by the beating, and ſome of the apples being hardly broken, when others are reduced to a perfect pomice.

There are ſeveral engines uſed for grinding the apples; but one in particular, reſembling a tanner's mill, is uſed in many parts of England. It conſiſts of a circular trough in which apples are bruiſed by a large flat ſtone moved round upon its edge. This engine we have repreſented on Plate VI. Fig. 8, where M is the ſtone ſet upon its edge; N, the ſpring-tree bar, or that to which the horſe is faſtened; P, Q, R, the circular trough in which the ſtone moves; T, L, V, compartments, or diviſions for different ſorts of apples.

When the apples are ground, ſome carry them directly to the preſs, but others empty them out of the trough into tubs, or large, wide, ſhallow vats. This work is done with moſt eaſe by broad wooden ſhovels: which ſhould alſo be uſed to turn the pomice in the vats five or ſix times a day, to prevent any fermentation; the whole of this operation being chiefly intended to give the pomice a red colour, which afterwards heightens that of the cyder, and brings it to a deep, fine amber. This buſineſs is over in two days.

From theſe vats the pomice is carried directly to the preſſes, of which there are ſeveral kinds: we have given figures of two kinds on Plate VI. where Fig. 9, is the ſmall cyder preſs, by which the juice is preſſed out of the pomice by means of a ſtone, or block of heavy wood, cut in the form of the fruſtum of a cone, and moveable about the center. The pomice is ſpread upon the bed of the preſs, where a conical preſſer is turned round by means of a lever inſerted into its baſis, by which means the juice is forced out, and conveyed by notches cut in the bed to the veſſel, by means of a ſpout, and repreſented in the figure.

Fig. 10, is a large cyder-preſs, where A B is the baſe with its ſupporters. C, C, the cheeks, which are upright beams, whoſe lower extremities are ſunk in the earth, where they are firmly fixed by croſs-bars and maſonry. They are connected at the top by two beams, the lowermoſt of which contains the nut, or female ſcrew. D is the ſcrew with its wheel; below which is the bearer, or large piece of timber on which the force of the ſcrew is exerted, in order to ſink the beams croſſing the planks that cover the pomice or cheeſe, as it is then called. G, G, are the planks on which the pomice is diſpoſed in hair bags, in order to be ſqueezed: theſe planks are cut in notches to conduct the liquor to a veſſel properly placed to receive it. The bed of this preſs is ſupported on a maſſive work of maſonry. It is the wheel which forces down the ſcrew and bearer upon the pomice laid in hair bags upon the bed of the preſs. This is done by turning the wheel H round; for by that motion the cord is wound round its axis, and by that means the wheel fixed on the bottom of the ſcrew is turned round, and the bearer together, with the croſs planks under it, are forced down upon the pomice, laid in bags upon the bed.

Theſe bags hold about two or three buſhels, or as much as the mill can grind at once; and theſe are heaped over each other till the preſs is full. The larger preſſes will hold from eight to fifteen bags, which yield from one to two hundred gallons of liquor, according to the largeneſs of the cheeſe. To perform the work neatly, it is neceſſary to have two ſets of theſe bags, for they clog and fur in preſſing, and, conſequently, become unfit for uſe till they have been waſhed and dried; ſo that while this is doing, either the preſs muſt ſtand ſtill, or another ſet be ready employ it.

Some, inſtead of hair-bags, lay long ſtraw under the pomice, the ends of which they turn up over it; then cover the pomice entirely with freſh clean ſtraw, upon which they ſpread another layer of pomice, and ſo on, alternately, till the preſs is full. Either of the above methods will do: but thoſe who are deſirous of doing the work in the neateſt and beſt manner, generally uſe the bags.

It is uſual to diſpoſe of all the liquor preſſed out of the cheeſes, the ſame way, and without diſtinction: but if the analogy holds, as it ſurely does, between cyder and other vinous liquors, this muſt be a conſiderable error. Experience has ſufficiently ſhewn, that in making wines, there is a very great difference between the firſt yieldings of the grapes, and the juices which are afterwards extracted by hard preſſings; and this difference is always in favour of the former; ſo that, if the ſame be true of cyder, the richeſt, and choiceſt kinds are loſt, by an imprudent mixture of the whole.

It is an opinion generally received, and the writer of the letters in the Dublin Society's Weekly Obſervations, already mentioned, has adopted it; namely, that ſummer fruit do not make good cyder. "Summer fruit, or ſweet apples, ſays he, afford only a weak, pert, windy juice, agreeable enough to the palate from its livelineſs and tartneſs, but in a great degree unwholeſome. It has no body, and therefore will not keep, and ſcarcely deſerves the name of cyder." But Sir Paul Neile, whoſe reaſoning we ſhall give in his own words, judged very differently.

"I aſſert, ſays he, that the beſt apples will make the pleaſanteſt, which in my opinion is the beſt cyder; and I account thoſe the beſt apples, whoſe juice is the pleaſanteſt at the time when firſt preſſed, before fermentation.

I ſhall need, beſides the experience of the laſt ten years, only to ſay, that it is an undeniable thing in all wines, that that the pleaſanteſt grapes make the richeſt and pleaſanteſt wines, and that cyder is really but the wine of apples, and not only made by the ſame way of compreſſion, but, left to itſelf, hath the ſame way of fermentation, and therefore muſt be liable to the ſame meaſures in the choice of the materials.

"This truth was not formerly owned, by reaſon that in Herefordſhire, and thoſe countries where they abound with pippins and hard apples of all ſorts, they make cyder of both kinds, and uſed them alike; that is, as ſoon as they had ground and preſſed the apples and ſtrained the liquor, they put it into their veſſels, and there let it lie till it had worked, and afterwards was ſettled again and fined, as not thinking it wholeſome to drink till it had thus, as they call it, purged itſelf; and this was the frequent cuſtom of moſt men in the more ſouthern and weſtern parts of England alſo. Now, when cyder was thus managed, it is no wonder that when they came to broach it, they for the moſt part found their pippin cyder not ſo pleaſant as their moyle or red-ſtreak cyder; but to them it ſeemed a wonder, becauſe they did not know the reaſon of it, which I ſhall next explain: for till they knew the reaſon of this effect, they had no cauſe but to think it was the nature of the ſeveral apples that produced it; and conſequently to prefer the hard apple cyder, and to uſe the other apples, which were good to eat raw, for the table, for which the hard apples were totally improper.

"To ſhew that, in Herefordſhire, they know not what was the true cauſe why their pippin-cyder was not, as they uſed it, ſo good as the cyder made of hard apples, I ſay, that for all liquors which are vinous, the cauſe that makes them ſometimes harder or leſs pleaſant to the taſte, than they were at the firſt preſſing, is the too much fermenting. If wine or cyder by any accidental cauſe do ferment twice, it will be harder than if it had fermented but once; and if it ferment thrice, it is harder and worſe than if it had fermented but twice; and ſo onward, the oftener it ferments, and the longer it ferments, it ſtill grows harder.

"According to the old method of making and putting up the cyder, they took little care to put up only the clear part of their liquor into their veſſels or caſks. Now pippins being a ſofter fruit, are in the mill bruiſed into ſmaller particles, than the harder ſorts of apples; and conſequently more of thoſe ſmall parts paſs the ſtrainer in the pippin cyder, than in the cyder of hard apples. This cauſeth a ſtronger fermentation, and, according to my former principle, a greater loſs of the native ſweetneſs, than in the hard apple cyder; and not only ſo, but the lee of the hard apple cyder being compounded of greater particles than the lee of the pippin cyder, every individual particle is in itſelf of a greater weight than the particles of the lee of the pippin cyder, and conſequently leſs apt to riſe upon ſmall motions. When the fermentation of the hard apple cyder is once over, a ſecond fermentation ſeldom happens, unleſs the veſſels be ſtirred: but in pippin cyder it is otherwiſe; for if the groſs lee be ſtill remaining with the cyder, it needs not the motion of the veſſel to cauſe a new fermentation; but every motion of the air, by a change of weather, will cauſe a new fermentation, and conſequently make it work till it hath deſtroyed itſelf by loſing its native ſweetneſs. This alone hath been the cauſe why commonly when they broach their pippin cyder, they find it ſo unpleaſant.

"What firſt gave me the hint of this, is that in divers parts they make three ſorts of wine out of one and the ſame grapes; that is, they firſt take the juice of the grapes without any more preſſing than what comes from their own weight, and the bruiſing they receive when put into the vat; which cauſeth the ripeſt of theſe grapes to break, and the juice, without any preſſing at all, makes the pleaſanteſt aud moſt delicate wine. The ſecond ſort they preſs a little, which makes a wine neither ſo pleaſant as the firſt, nor ſo harſh as the laſt, which is made by the utmoſt preſſing of the very ſkins of the grapes, and is by much more harſh than either of the other two. Now I preſume the cauſe of this at leaſt in part, to be, that in the firſt ſort of wine, which hath little of the ſubſtance, beſides the very juice of the grape, there is little lee, and conſequently little fermentation; and becauſe it doth not work long, it loſes but little of its original ſweetneſs. The ſecond ſort, being a little more preſſed, hath ſomewhat more of the ſubſtance of the grape added to the juice, and therefore, having in it more of that part which cauſes fermentation, ferments more ſtrongly, and is therefore, when it hath done working, leſs pleaſant than the firſt ſort, which worked leſs. For the ſame reaſon the third ſort, being moſt of all preſſed, hath moſt of the ſubſtance of the grape mingled with the liquor, and worketh the longeſt: but at the end of the working, when it has ſettled and is clear, it is much more harſh than either of the two firſt ſorts. The thought of this made me firſt apprehend, that the ſubſtance of the apple, mingled with the juice, was the cauſe of fermentation, which is really nothing elſe but an endeavour of the liquor to free itſelf from theſe heterogeneous parts which are mixed with it: and when there is the greateſt portion of thoſe diſſimilar parts mingled with the liquor, the endeavour of nature muſt be ſtronger, and take up the more time to perfect the ſeparation, which, when finiſhed, leaves all the liquor clear, and the groſs parts called the lee, ſettled to the bottom of the veſſel. Nor did this apprehenſion deceive me: for when I began to ſeparate a conſiderable part of the lee from the cyder before it had fermented, I found it to retain a very great part of its original ſweetneſs, more than it would have done if the lee had not been taken away before the fermentation; and this not once, but conſtantly for ſeven years.

"The method which I uſed was this: when the cyder was firſt ſtrained, I put it into a great vat, and there let it ſtand twenty-four hours at leaſt, but ſometimes more, if the apples were more ripe than ordinary: then, at a tap before prepared in the veſſel, three or four inches from the bottom, I drew it into pails, and from thence filled the hogſhead, or leſſer veſſel, leaving the greateſt part of the lee behind. During this time that the cyder ſtood in the vat, I kept it as cloſe covered with hair-cloths, or ſacks, as I could; that ſo too much of the ſpirits might not evaporate.

"Now poſſibly I might be aſked why I did not, ſince I kept it ſo cloſe in the vat, put it at firſt in the veſſel: to which I anſwer, that had I put it at firſt into the veſſel, it would poſſibly, eſpecially if the weather had chanced to prove wet and warm, have begun to ferment

ment before that time had been expired; and then there would have been no poſſibility to ſeparate any part of the groſs lee, before the fermentation had been wholly finiſhed; which keeping it only covered with theſe cloths was not in danger: for though I kept it warm in ſome degree, yet ſome of the ſpirits had ſtill liberty to evaporate; which had it been in the hogſhead with the bung only open, they would not freely have done; but in the firſt twenty-four hours it would have begun to ferment, and ſo my deſign had been fully loſt: for thoſe ſpirits, if they had been too ſtrongly reverberated into the liquor, would have cauſed a fermentation before I could have taken away any part of the groſs lee. The great myſtery of the whole lies in this; to let ſo many of the ſpirits evaporate, that the liquor ſhall not ferment before the groſs lee be taken away; and yet to keep ſpirits enough to cauſe a fermentation when you would have it; for if you put it up as ſoon as it is ſtrained, and do not let ſome of the ſpirits evaporate, but ſuffer the groſs lee to be ſeparated by its own weight only, without fermentation, it will ferment too much, and loſe its ſweetneſs; whilſt on the other hand, if none be left, it will not ferment at all, and then the cyder will be dead, flat, and ſour."

Experience taught Sir Paul, that it was neceſſary to delay the fermentation till late, or till the cold weather had come in, as he informs us, when he ſays, "It is neceſſary that the apples have a little time to ſweat in the houſe before the cyder is made; but not too much: for if they be not full ripe before they are gathered, and not ſuffered to lie a while in the heap, the cyder will not be ſo pleaſant; and if they be too ripe when they are gathered, or lie too long in the heap, it will be very difficult to ſeparate the cyder from the groſs lee before the fermentation begins: and in that caſe it will work ſo long, that when it fines, the cyder will be hard: for when the apples are too mellow, they will break into ſo ſmall particles, that it will be long before the lee ſettles by its own weight only; and then the fermentation may begin before it be ſeparated, and ſo deſtroy your intention of taking away the groſs lee. And if the apples be not mellow enough, the cyder will not be ſo pleaſant as it ought to be."

To the cauſe above aſſigned by Sir Paul Neile for the liquor's fermenting too much, another may be added; namely, that as the ſummer fruits are fermented earlier than the hard apples, the warmth of the weather hurries the fermentation on too faſt, and by this means renders the liquor much leſs palatable: or it may even hurry it beyond the vinous ſtate, till the acetous fermentation begins. The ſweetneſs of the ſummer fruits make them likewiſe more liable to ferment too much; whereas, the ſour toughneſs of hard apples retards that operation, and makes a longer time neceſſary to perfect the vinous fermentation. Theſe cauſes render it neceſſary that great care be taken in the preparing the juice as directed by Sir Paul, and that there be a cellar in which the heat is ſuited to carry on as ſlow a fermentation as poſſible. If the maker of the cyder is not provided with ſuch a cellar, the juice of the apples may be buried in cold ſpring water, as before mentioned, and be kept there till the temperature of the weather becomes fit for its being fermented.

"What has been ſaid of the time for making the pippin cyder, may, adds Sir Paul Neile, with due allowances, for the nature of the apples, ſerve for all other ſummer fruit; as the Kentiſh-Codlin, marrigold, gilly-flowers, ſummer-pearmains, ſummer-pippins, Holland-pippins, golden-pippins, and even winter-pearmains. For though they muſt not be made at the ſame time of the year, yet they muſt be made at the time when each reſpective fruit is in the condition before directed for the pippin. Nay, even in the making of that cyder, you are not tied preciſely to that particular time, but, as the condition of year hath been, you may make your cyder one, two, three, or four weeks later."

When the preſſing of the apples is finiſhed, the moſt careful makers of cyder ſtrain their liquor through a hair ſieve, to ſeparate from it the coarſeſt dregs; which is a practice every way adviſeable. It muſt then be left to itſelf, till it has undergone the neceſſary fermentation, and depoſited its groſſer lees. To this purpoſe ſome put it immediately into hogſheads, others into large tubs or vats, and the moſt curious into a veſſel intended for that very uſe, wide at top, and growing narrower all the way down to the bottom, near which is a tap to draw off the liquor. This veſſel is fixed upon a ſtand, or ſtilling, and frequently contains from five to twenty hogſheads. In theſe veſſels the heavier lees ſubſide, and the lighter form at top a cruſt, which by its ſinking afterwards, gives timely notice that the ferment is gone off, and that the liquor is fit for racking. Some gentlemen, who ſpare no pains to make their cyder as fine as poſſible, think that the excellence of the liquor depends greatly on catching the very inſtant when this cruſt breaks; and in order to be ſure of it, they ſet a perſon to watch and give immediate notice of the crack or noiſe which the cruſt makes in breaking. They hold this to be the critical time for racking off the liquor, and maintain, that ſo much of its ſpirit is evaporated very ſpeedily after, as to render the cyder irrecoverably vapid. This, therefore, ſhould be carefully attended to; and upon the firſt appearance of the cruſt's falling, the cyder, which is then become tolerably fine, ſhould be drawn off the groſſer lees, and tunned into the hogſheads. The uſual time taken up in this primary fermentation is from thirty-ſix to forty-eight hours; more or leſs, according to the weather. Some affirm that they have had good cyder by tunning it directly from the preſs, without any other caution than leaving room for the liquor to ferment in the hogſhead, where it remains from firſt to laſt: but this method is liable to many hazards, and ſucceſsful, where it has been ſo, only in favourable ſeaſons. The groſs lees are apt to riſe on every conſiderable change of weather, and when they do, they ſet the cyder on the fret, which, ſhould it do no worſe, certainly robs it of its ſpirit, and, when over, leaves it flat and vapid. Beſides, repeated experiments have proved, that ſourneſs in all fermented liquors begins ever at the lees, and therefore the more of them is left among the cyder, the more readily it will turn eager.

Here I muſt obſerve, that a moſt important precaution is too often overlooked by many of thoſe who make cyder of winter fruits; for that a ſufficient warmth of the air is as eſſential to ferment the rough juices of hard apples, as it is dangerous to ſuffer the heat to be too great in the fermenting of cyder made of ſummer fruits. If the weather is very cold when the hard apples are preſſed, the help of fires ſhould be recurred to; or if that has been neglected, or could not be conveniently uſed, it will be right to carry the cyder to a

place

place warmed conſiderably by the ſun for a ſhort time, in the ſummer, and there to place it out of the immediate reach of the rays of the ſun. The bung of the caſk muſt be looſened, becauſe there will ariſe a degree of fermentation, which will attenuate any viſcidity not overcome by the firſt fermentation. Great care muſt be taken that this fermentation be not carried beyond the nice point of correcting the rough raw taſte of the fruit: for if it goes farther, the liquor will either become vapid, or turn to vinegar. As ſoon as the deſired point is obtained, the liquor ſhould be racked off, eſpecially if much feculence has ſunk to the bottom, and it ſhould then be carried down into the vault, where it may be preſerved long in perfection.

The choice of proper veſſels to keep the cyder in after it has fermented is very material; no liquor being ſo apt as this to take the taſte or tang of the caſk. New veſſels, though the wood be ever ſo well ſeaſoned, generally give a diſagreeable reliſh to all liquors, and will do ſo remarkably to cyder, unleſs due caution be uſed before-hand. Frequent ſcalding with hot water, into which ſome handfuls of ſalt have been firſt thrown, or with water in which ſome of the pomice has been boiled, and waſhing afterwards with cyder, are the uſual remedies againſt this evil, and ſeldom fail of removing it effectually. Of old caſks, beer veſſels are the worſt; they always ſpoil cyder, as, in return, cyder caſks infallibly ſpoil beer. Canary and brandy caſks do well, and all wine veſſels tolerably; for, provided the tartar adhering to their ſides be carefully ſcraped off, and they well ſcalded, there is no danger in uſing them. The beſt way of ſcalding them, is to boil a parcel of dried wormwood in water, and with that and a bruſh of the ſame plant to rub and ſcour their inſides. This will correct the acid of the tartar; and ſo will likewiſe all vegetable aſhes uſed in the ſame manner. Thoſe who adviſe fumigating the caſks with brimſtone, confidently affirm that the cyder becomes ſtronger, and keeps better, when the veſſels have been thus prepared, and for this reaſon they tun immediately after the operation, and before the ſmoak evaporates. To enable ſuch as may chooſe to examine, by fair trials, how far this is true in fact, I ſhall here add the neateſt method of performance. Melt a pennyworth of brimſtone, and dip in it a piece of new cloth, or of canvaſs, till all the brimſtone is imbibed, and the cloth or canvaſs looks like a piece of ſearcloth: then roll it cloſe, tie it, and with a wire ſuſpend it at the bung, three parts in four within the veſſel; light it, and let it burn till it is ready to fall into the caſk, then take it out, and tun without delay. Some add a little powdered cinnamon, cloves, pepper, or other ſpice to the brimſtone for fumigating, but I ſee no great reaſon for their ſo doing.

The beſt ſhaped veſſels for keeping cyder in are, as adviſed by captain Sylas Taylor, in a letter ſubjoined to Mr. Evelyn's Pomona, and by Mr. Worlidge, thoſe of which the barrel-boards are ſtrait, the veſſel broader at one end than the other, and ſtanding on the leſſer end, with the bung-hole in the top. The advantage of this form is, that in the drawing of the cyder, though but ſlowly, the ſkin or cream contracted by its fermentation (as is the caſe of all ſtrong liquors) deſcends, and covers the liquor by means of the tapering of the veſſel, and thereby preſerves to the laſt the ſpirits of the cyder, which would otherwiſe evaporate and waſte. A little wheaten-bran caſt in after the fermentation, thickens this coat or cream of the liquor, and thereby conduces much to its preſervation.

We come now to a point of great importance, and hitherto of as great uncertainty, which has raiſed among the curious a controverſy of long ſtanding, and not likely to be brought to a ſpeedy deciſion, without a courſe of regular experiments. Some maintain that continued fermentation and frequent racking, certainly ſpoil the cyder; whilſt others aſſert, that it can never be good without them. Some rack once, ſome twice, and others whenever the liquor frets. Some look upon the lees as the food and nouriſhment of cyder: others as a cauſe at hand, upon every change of weather, to ſet it on the fret, and turn it ſour. Every man has a ſyſtem of his own; and a peculiar practice conſequent thereon; and ſo great is the variety of methods, that nothing certain can be drawn from them but this one general concluſion, that we are ſtill at gueſs work, and muſt be obliged to future trials for any rules that can be thoroughly depended on. I ſhall therefore here relate the ſeveral ways now in uſe, and then give my own general opinion of this matter; but I ſtrongly recommend the making of accurate experiments on each.

One method is, to leave the cyder in the vats ſome days longer than was before adviſed, and till it fines in a greater meaſure: then to tun it into hogſheads, where it is to remain without any farther racking. Thoſe who recommend this practice ſay, that their cyder is thereby rendered the ſtronger and mellower: and thoſe who object to it reply, that lying on the groſſer lees, which cannot all be fallen in the vats, it muſt be apt to fret, turn foul, and, in unſettled weather, eager.

A ſecond and more common method is, a fortnight after tunning, to rack into other hogſheads. There the cyder undergoes a ſecond gentle fermentation, and while this laſts, the bung muſt be left open; afterwards, when the fermentation leſſens, covered only with a wet cloth, or a tile; and when it is quite over, ſtopped down cloſe with well tempered clay, kept moiſt to prevent its cracking, by ſtrewing over it a handful of bay-ſalt.

To this ſecond racking others add a third in March or April, when the lees have thoroughly ſubſided. This again is followed by a little fermentation, and for that reaſon chiefly it is objected to by thoſe who think every fermentation hurtful which is not ſtrictly neceſſary.

Others, on the contrary, and particularly thoſe of Devonſhire, where the ſtrongeſt cyders are made, look upon thorough fermentation as the great ſecret to have their cyder fine, light, and free from dregs, and accordingly they not only approve of the above laſt mentioned method, but proceed much farther, as follows:

At firſt tunning they do not fill their hogſheads to the bung, but leave an empty ſpace to receive a pailful of freſh cyder from the preſs: this renews or increaſes the fermentation, and ſets the whole on working with ſome violence. The froth which riſes at the bung is carefully ſkimmed off, and the waſte of liquor thus occaſioned is conſtantly repleniſhed with unfermented cyder. By theſe means the whole is kept from the fret for a conſiderable time: for it is not uncommon to have cyder thus managed working for a fortnight. A month after this operation, and the ſtopping of the veſſels, the cyder is racked, and, generally ſpeaking, in two months more a ſecond time: and if it frets, which however is ſaid ſeldom to happen in this method, it is racked off a third and a fourth time.

To make a proper choice among the ſeveral above recited methods, they ſhould be tried together, with the ſame fruit of equal ripeneſs; the cyders ſhould be kept to the ſame age, and their different qualities ſhould be attentively obſerved. Juſt information cannot be obtained in any other way: for the want of accuracy and exactneſs will render the experiment fruitleſs and inſignificant. Every one will tell you, that his method affords good cyder: but this general expreſſion gives no determinate idea, and forwards knowledge very little. Would gentlemen be at the trouble to keep notes, and minute down all the differences obſervable in the ſame cyders under different managements, it might ſoon be known what method gives the ſtrongeſt, which the neateſt, the rougheſt, melloweſt, or lighteſt cyders: and every one might then purſue, as his taſte or intereſt ſhould direct, that which would anſwer beſt: but till ſomething of this kind be done, only very ſlow and inconſiderable improvements can be expected.

In the mean time I muſt obſerve, in general, that whenever the lees of cyder are in ſuch quantity as that the liquor cannot preſerve them from a tendency to putrefaction, as muſt be the caſe with the firſt, and generally the ſecond lees, it is certainly adviſeable to rack off the liquor; and that, if the cyder is kept in a place not ſubject to the various changes of the weather, the little fermentations raiſed by racking cannot be attended with any great danger, nor will the frettings return. But as to the frequently repeated fermentations which are ſaid to be, of choice, the practice of the makers of cyder in Devonſhire, they ſurely are by no means adviſable.

The few points which experience has hitherto determined in regard to the making of cyder are, that weak cyder cannot bear above one or two rackings without too great a loſs of ſpirits; that ſtrong cyder made of winter apples will ſtand ſeveral rackings, and thereby grow mellower, and be the ſooner fit for drinking; that the more the liquor is fermented, the rougher it will grow; that fermentation is no other way ſo well promoted, as by putting into the hogſhead, from time to time, ſome of the liquor freſh drawn from the preſs: and laſtly, that to have a rich, racy, palatable cyder, a little inclining to the ſweet, great care muſt be taken to prevent all future fermentation after the liquor is once become fine. If it ſhould be foul, iſinglaſs will help to fine it, by precipitating the flying lee.

In general, the cyder that is longeſt in fining is the ſtrongeſt and moſt laſting, if it has been made of thoroughly ripe fruit: but, as was before obſerved in the article of wines, all liquors will be much longer in clearing in mild moiſt weather, than in cold dry weather or froſt.

When the bung-hole of the veſſel is cloſed up, a ſmall vent-hole ſhould be left open, or but looſely ſtopped with a peg, for ſeveral days, till the wild ſpirit of the liquor be ſpent: for otherwiſe it will break the caſk, or find ſome other vent, which, though but ſmall, will always abide open, and prove the ruin of the cyder. Many have ſpoiled their cyder by this only neglect, and never apprehended the cauſe thereof. After this wild ſpirit is ſpent, the vent-hole, as well as the bung, ſhould be ſtopped quite cloſe; and then the cyder, tho' ſeemingly flattiſh at firſt, will ſoon improve, and become briſk and pleaſant.

Deadneſs or flatneſs in cyder, if occaſioned by a too free admiſſion of air into the veſſel, for want of right ſtopping, is remedied by grinding a ſmall parcel of apples, and putting them into the caſk, which ſhould then be ſtopped up cloſe: but care muſt alſo be taken to open the vent ſometimes, or the veſſel will be in danger of burſting. The liquor thus managed muſt likewiſe be drawn off in a few days, either into bottles, or into another caſk, leſt the murk ſhould corrupt the whole maſs; to prevent which, ſome put in only the juice of the newly preſſed apples. The ſame may be done to flat bottled cyder, by adding about a ſpoonful or two of new muſt to each bottle of the dead liquor, and ſtopping it again. Cyder that is dead or flat will often revive again of itſelf, if cloſely ſtopped, upon the revolution of the year, and the approach of ſummer: but cyder which has acquired a deadneſs or flatneſs by being kept in a beer veſſel, cannot be revived again.

Thick cyder may be rendered clear and good by a ſecond fermentation, or ſometimes by only throwing into it two or three quite mellow apples. But cyder in which the acetous fermentation has taken place, can never be reſtored. If it be only a little ſouriſh, or drawn off in another veſſel, about a gallon of wheat (blanched is beſt) to a hogſhead of cyder, and ſo in proportion for any other quantity, will both amend and preſerve it: or if it is ſo ſour that the wheat does not anſwer that purpoſe, it may be corrected by egg ſhells, powdered alabaſter, &c.

Cyder which has contracted any ill flavour or taſte from the veſſel, or from any other cauſe, will be helped by the addition of a little muſtard ſeed ground with ſome of the cyder.

Ginger accelerates the maturation of cyder, gives it more briſk ſpirits, helps fermentation, promotes its duration, and corrects its windineſs.

When the juice is too thin or weak, it is a common and very adviſable practice to give by art that ſtrength which nature had not beſtowed. To this end, raiſins of the ſun, or the lees of rich wines, are uſed with good ſucceſs; as is alſo ſugar. Writers on this ſubject give various directions for the uſe of this ingredient: but it would be needleſs to repeat them here, as it is of very little importance in what manner it be done, the giving a body to the liquor being the only thing wanting, and this a proper quantity of ſugar will effect, in whatever ſhape it is uſed. When the deſign is to colour the cyder, the ſugar is boiled till it becomes brown, and then put into the caſk.

CYTISUS, the name of a plant much cultivated by the old Romans for the food of cattle, and called by ſome ſhrub-trefoil, and by others ſhrub-lucern.

It riſes to the height of five, ſix, or even more feet, with a ſhrubby ſtalk, covered with a greyiſh bark, and divided into many branches, covered with a hoary down while they are young, and garniſhed at each joint with trifoliate leaves ſtanding upon foot ſtalks about an inch in length. There are two or three of theſe at each joint, ſo that the branches are cloſely covered with them. The lobes are ſmall, ſpear-ſhaped, and hoary on their underſide; and theſe leaves remain all the year. The flowers, which are of a bright yellow, blow on foot-ſtalks which ariſe from the ſides of the branches, each foot-ſtalk ſuſtaining four or five flowers, and theſe are ſucceeded by compreſſed moon-ſhaped pods, each containing three or four kidney-ſhaped ſeeds.

The cytiſus may be raiſed either from its ſeed ſown about

about the middle of October, or in the beginning of April; or if greater ſpeed be deſired, from cutting ſlips, or layers, planted in the ſpring or autumn, ſo as to leave a ſpace of four feet between each plant. Such are the directions of Columella, who adds, that if the ground be well dunged for this planting, and well hoed up round the plants, which ſhould be watered during the firſt fortnight, if rain does not fall, plentiful crops may be obtained from this excellent vegetable, equally fit for horſes, oxen, cowes, ſheep, hogs, goats, and poultry. It is alſo ſingularly profitable for bees, whoſe honey it increaſes prodigiouſly. It has the ſame effect upon the milk of cows, beſides greatly improving its quality. In the kingdom of Naples the goats feed upon it, and great quantities of excellent cheeſe are made from their milk. In the iſlands of the Archipelago, the Turks make handles for their ſabres of the wood of this ſhrub, which, when full grown, is as hard as ebony, and of a fine yellow colour. It will bear cutting as often as its ſhoots are about fifteen or eighteen inches long, which may be ſeveral times in the year; for it ſhoots and flowers during eight months in the countries where it grows well, and continues green during the whole winter, if the ſeaſon be at all favourable. Its ſeeds begin to ripen towards the end of Auguſt, and continues to do ſo until the cold ſtops them. It will be fit for cutting at the end of three years at fartheſt, and ſhould be carefully kept clear of weeds, and hoed up between each cutting. If given as green fodder, which it affords during eight months of the year, about fifteen pounds weight of it are ſufficient for the daily food of a horſe, twenty pounds for an ox, and ſo in proportion for other cattle, according to their ſize and ſtrength. When made into hay, it ſhould be given more ſparingly, becauſe it is then more nouriſhing. In this ſtate it ſhould be ſteeped in water, before it is given to cattle, and then be mixed with chaff or ſtraw. The time of cutting it for hay, is when the greater part of its ſeeds begin to grow large; and the manner of making this hay is, to let the ſwarths lie ſome hours in the ſun, till they are faded, and then to dry them thoroughly in the ſhade. *Columella De Ruſtica, Lib.* V. *cap.* 12.

Mr. Miller allows the cytiſus every quality that can recommend it for the feeding of cattle in the countries where it grows naturally, ſuch as the iſlands of the Archipelago, Sicily, and the warmeſt parts of Italy, but is perſuaded that it will not thrive in England, ſo as to be of any real advantage for that purpoſe here, becauſe it cannot bear ſuch hard froſts as we ſometimes have; or if it does not bear them ſo far as not to be abſolutely killed, it will be ſo much damaged thereby, as not to be able to recover its verdure before the middle or latter end of May; nor even then to put forth ſhoots that will bear cutting more than once in a ſummer; beſides, their being ſo woody, if ſuffered to grow to any conſiderable length, as to render that cutting very troubleſome, and of little ſervice by way of fodder. He therefore thinks, upon the whole, that it can never anſwer the trouble and expence of cultivation in this country, where we have many other preferable plants; but that in hot, dry, rocky countries, of which we have now ſeveral in our colonies, where few other vegetables will thrive, this may be cultivated to great advantage, for it will live there many years, and proſper very well.

D.

DAB-CHICK, a chick newly hatched.

DAG, dew hanging upon the graſs.

DAIRY, the occupation, or art of making various kinds of food from milk, particularly butter and cheeſe. It alſo ſignifies the place where theſe operations are performed.

The following account of managing a dairy was written by a gentlemen who has for a conſiderable number of years employed himſelf in that buſineſs, and acquired by his induſtry a plentiful fortune.

He begins with recommending the cultivation of ſainfoin to every perſon concerned in a dairy, as it is obſerved to increaſe the milk of cows, both in quantity and quality, above any artificial paſture yet known, and therefore he adviſes the farmer to keep his cows upon it, and form a five years dairy.

"An acre of the worſt land, continues he, will, when improved by this graſs, maintain four cows very well from the firſt of April to the end of November, and afford beſides a ſufficient ſtore of hay, to make the greater part of their ſubſiſtance the four winter months following. You muſt buy then about four hundred milch-cows, but take care you chuſe them with judgment. I have bought your largeſt ſort of runts from Wales for leſs

leſs than fifty ſhillings a cow, with a good calf by her ſide, which I always diſpoſed of as ſoon as I could. You will obſerve, that I make too good an uſe of the milk to afford the calf his ſhare of it: I generally keep theſe cows above twelve months, and then ſelling them, ſometimes for four pounds a piece, I ſtock myſelf with ſuch that are new milched. I obſerve this rule every year, and the trouble is ſufficiently rewarded by the advantage it brings me; for beſides the profit I make by ſelling dearer than I buy, I avoid the incovenience of having any thing to do with bulls, and the conſequences; ſo that I always preſerve my cows in their full milk, and find it no uncommon thing for one of theſe milch-cows to be milked twice a-day, and afford a gallon and a half at a meal. Four hundred of theſe cows will coſt a thouſand pounds; and you will find, that coming from a poor paſture to a rich, they will proſper and increaſe both in milk and ſize. In eight convenient places about your hundred acres let there be built eight thatched ſheds; a little riſing in the middle to carry off the water; the height may be ten feet, and the breadth thirty; each of theſe ſheds ſhould be a hundred and twenty-five feet long, and, under the higheſt part, directly in the middle, you muſt raiſe a ſlight partition, lathed and plaiſtered, which ſerves to ſupport the ridge of the roof, while the two ſides are ſuſtained by ſquare wooden poſts, about eight feet high, and placed at proper diſtances.

"On either ſide of the partition wall let there be fixed a kind of a rack, like thoſe in ſtables, which is to run the whole length of the ſhed, and muſt be placed as high as a cow can reach her fodder from. The ſhed muſt next be divided into ſtalls, like thoſe for ſtone-horſes, and each ſtall will be above five feet broad; the length of theſe ſtalls muſt be exactly fitted to that of a cow, that a croſs bar, being placed at the outward end, may keep the beaſt from running backwards: thus every ſhed will hold fifty cows, five and twenty on each ſide of the partition: to every one of theſe ſheds you muſt appoint a man, whoſe buſineſs it will be to clear the place, and carry off the dung; as alſo to mow the ſaintfoin every day, and give it to the cows in the rack before-mentioned: this man beginning at one end of his proportion of ground, and going gradually on to the other, the firſt place will always be fit to mow again by that time he has gone through his whole diviſion. Your cows are thus fed at diſcretion, with neither too much nor too little; they are not peſtered with the ſcorching heats, nor troubled with the ſtinging-fly, which, in open paſtures, often makes them wiſk about, and trample down more graſs than they eat. At each end of every ſhed you muſt build a ſlight room of brick, thirty feet ſquare, and ten feet high, which is to be divided, the croſs-way of the ſhed, into two partitions, each fifteen feet broad, and thirty feet long; that which joins the cow-houſe muſt be paved with tiles, and is to ſerve for a dairy; the other muſt be floored and windowed, and is to be a lodging-room for the dairy-maids. Every ſhed will require five maids, that is, to every ten cows one dairy-maid; fewer might ſerve, but it is better to exceed, than fall ſhort in this particular. Thus each dairy will have two or three maids belonging to it, whoſe lodging will be the room adjoining, and whoſe care is to extend to the ſhed on both ſides the partition, to the five and twenty cows which are the neareſt to their ſtation. All along both ſides of the partition, at about a foot above the ground, muſt there be fixed, cloſe to the wall, a ſtrong pipe of lead, a little leſs than an inch diameter; both which pipes, being ſomewhat raiſed exactly in the middle of the ſhed, muſt have a gentle and almoſt an inviſible deſcent from that riſing to the dairies, through the wall of which their nether ends are to be brought, and there wrought into one another, that whatever deſcends through them, into either of the dairies, may have iſſue but at one mouth. This mouth of the pipes muſt be made very ſmall, and neatly fitted into the hollow end of a ſtrong wooden axle-tree; which, whilſt it is turning ſwiftly round the mouth of the pipe, may by no means ſtrain it by the motion, but receive, into its own hollow, the milk which deſcends through the leaden pipes, without ſpilling any, and paſſes ſo far through a wheel, or veſſel like a barrel, only much larger in its circumference. The axle tree, which this veſſel is to turn upon, is bored very full of round holes, through which it delivers the milk into the veſſel, as faſt as it receives it from the pipe.

"The veſſel muſt be capable of containing, at leaſt, three times the quantity of milk which it is deſigned to receive; and there muſt be ſix wings, or thin pieces of wood, glued on edge-ways to the wooden axle-tree, whoſe length and breadth muſt be ſo contrived, as to leave a free ſpace of ſix inches at either end of the axle tree, and a foot between their edges length-ways, and the ſmooth inſide of the veſſel; in the moſt convenient part of which muſt be contrived a door, to open and ſhut down upon occaſion, as cloſely as if there was none. This door will perform its work very neatly, if you line the inſide and edges with ſome kind of cloth, which is commonly uſed in the preſſing of cheeſe. The other ſolid end of the axle-tree muſt extend itſelf about five feet longer; and the whole length may be ſupported by ſquare wooden poſts, and turn in their tops, which are to be made hollow, and kept greaſed for that purpoſe. This end of the axle-tree is to be faſtened into a wheel, exactly like thoſe which are uſed in many places for roaſting of meat. The diameter of this laſt wheel muſt be within ſix inches of the height of the dairy, and two or three large dogs being put into it at a time, will turn it with extraordinary ſwiftneſs: the dogs are eaſily taught, and will at laſt take delight in the exerciſe. I have brought up a large buck to the practice of this labour, and it is wonderful to ſee the force with which he runs round an hour or two together, and turns a wheel of ten feet diameter; but you muſt make your wheel as light as it can poſſibly hold together. I have but one thing more to ſay, and I finiſh this direction; pretty near that ſide of every ſtall in your ſhed, to which the maid muſt come to milk the cow which belongs to it, let a hole, as ſmall as will ſerve the occaſion, be contrived by your plumber, in the uppermoſt part of the leaden pipe, to ſhut and open with a little ſcrew, which ſcrew, for fear of loſing it, may be faſtened by a little iron chain to the body of the pipe. I have endeavoured, in the deſcription of all this, to make my meaning as plain as poſſible, and hope the reader will, with a little attention, comprehend the whole."

The ingenious Mr. Liſle obſerves, that ſo much cleaning and ſcalding is neceſſary, that the dairy farmers ſpend as much wood in fire for that purpoſe, during the ſummer, as they burn for other purpoſes in the winter.

If the milk veſſels are not kept clean they will be ſour, and the cheeſe will be ſour before it can can come, and it will eat ſour and choaky. A cold dairy is a great means of preſerving cream from turning ſour. The milk-houſes ſhould alſo be large, for otherwiſe the ſteam

ariſing from the hot milk as brought in from the cows will heat the air of the room.

Care ſhould be taken when cows begin to give off their milk, to milk them clean; for if this be neglected they will ſoon grow dry. Cows generally begin to give off the height of their milk about the time of the bloſſoming of the wheat, and continue ſo till a good aftermath comes on, when their milk will increaſe; but cold and rainy weather in the autumn will ſoon abate their milk again. Perhaps the reaſon why the milk of cows abates about wheat bloſſoming time is, becauſe about that time the graſs of the field bloſſoms alſo, and the fluſh of the ſap is come to its height and maturity, and then abates, for the roots of the graſs at that time begin to harden and grow dry; nor do they take in the juices of the earth ſo freely as they did before, and therefore grow drier and drier, till the ſeed is hardened. The ſeed being thus brought to maturity, the roots of the graſs for ſome time, till the cold of the winter checks them, ſtrike freſh ſap roots, or buds, preparative to the enſuing ſpring, and which will the next year be the ſpring roots and increaſe. On theſe new efforts the ſtart of the autumn graſs depends, till the cold checks it. This graſs is called the aftermath, and upon the growth of this the cows milk depends.

It has been obſerved, that the milk of the hill-country cows do not yield the ſame proportion of cream as that of the vale cows; owing, in all probability, to the poverty of the hill-country cows, which are generally poor in caſe.

Thunder will break the cream, and turn the milk in the milk-pans, ſo that no cream can be ſkimmed off for butter; nor will the cheeſe-curd hold together, but will break aſunder.

It is commonly ſaid, that a quart of cream will make a pound of butter; but this muſt be underſtood of cream that hath ſtood two or three days to ſettle, for three pints of cream juſt ſkimmed from the milk will, in three days, be reduced to nearly a quart. If you bring in the milk and ſtrain it immediately into the pans, without letting it firſt ſtand to cool, the cream produced by it will be much leſs than it would have been if the milk had been ſuffered to ſtand and cool before ſtraining.

In ſome parts of Dorſetſhire they ſet the milk over the fire in braſs pans to warm, which makes the cream riſe, and when a bladder is formed in the middle, they take the pans from the fire, ſkim off the cream, and put it into a tub. After this the dairy-maid, by only putting her hand, and ſtirring it about in the tub, brings it preſently to butter, without the help of a churn. The butter made by this method is very rich, but the cheeſe made from the ſkim-milk very poor. *See the article* CHEESE.

The hill-country farms are not ſo well adapted to a dairy as thoſe in the vale; becauſe the foddering ſeaſon in the former holds ſo much longer, occaſioned by the rowet-graſs falling off a month ſooner, and the ſpring-graſs coming a month later than in the vale. *Liſle's Huſbandry, vol.* II. *p.* 139.

DAISY, the greater, or *ox-eye*, by ſome called *maudlin-wort*, is the name of a perennial weed common in paſtures. The leaves are jagged, and embrace the ſtalk. The flowers are large and radiated. The ray is white, and the diſk yellow: the ſeeds have no down.

DALLOP, a tuft, or clump.

DAM, a mole, or bank to confine water.

DAMSON, a ſmall black plum, brought originally from Damaſcus, whence the name.

DANDELION, the name of a very troubleſome and well-known weed in the meadows; and which will ſpread greatly, if the flowers are ſuffered to perfect their ſeeds, which are light, downy, and of courſe eaſily blown about by the wind.

DANEWORK, a name given in ſome counties to that ſpecies of elder, generally called dwarf-elder, or wall-wort.

DANK, damp, humid, moiſt, wet.

DAPPLE, marked with various colours.

DARNEL, *See* COCKLE.

Annual DARNEL-GRASS, called *white darnel* by Gerrard, and in the ſouthern counties *crap*. This plant is ſo much like the *red darnel-graſs*, that it has been greatly cultivated under the name of *ray-graſs*, or vulgarly *rie-graſs*; but the ſpike is much longer and paler, and has beards, which the ray-graſs is entirely without. It is likewiſe annual; whereas the ray-graſs has an abiding root. Its ſeeds ripen with the corn. *See* Plate VII. Fig. 1.

DAWN, the time when the light of the morning firſt appears.

DAY-BREAK, the dawn, the firſt appearance of light.

DAY-WORK, work impoſed by the day. Day-labour.

DEARTH, ſcarcity; a time when food is dear.

DEATH-WATCH, the name of an inſect that makes a ticking noiſe, ſuperſtiouſly imagined to prognoſticate death.

DECEMBER, the laſt month of the year.

The earth is now commonly locked up under its frozen coat, ſo that the huſbandman has leiſure to ſit and ſpend what ſtore he has before-hand provided.

Now is the time to houſe old cattle, to fell all ſorts of timber, and other trees for building, or utenſils, to cut coppices, &c.

Let horſes blood, fatten ſwine, and kill them. Deſtroy ant-hills.

Plough up your land that you deſign for beans, provided it be not frozen too hard; drain corn fields where the water ſtagnates, and overflow, or water your meadows.

Put your ſheep and ſwine to the peaſe-rick, and fatten them for the market. Cut hedges, and lop trees. *Mortimer's Huſbandry, vol.* II. *p.* 448.

DECIDUOUS, falling, not perennial: an epithet applied to ſuch trees and ſhrubs as ſhed their leaves in the autumn. Thus the oak, the elm, the beech, &c. are called deciduous trees.

DECLIVITY, inclination or declivity, reckoned downwards; gradual deſcent.

DEFICATION, the act of purifying any liquor from its lees or foulneſs.

DELVING, digging, or the act of turning up the earth with a ſpade.

DEMAIN, or *demenſe*, the land which a man holds originally of himſelf. It is alſo ſometimes uſed as a diſtinction between thoſe lands which the lord of the manor hath in his own hands, or in the hands of his leſſee, and ſuch other lands appertaining to the ſaid manor as belong to free or copy-holders.

DENSHIRING. *See the article* BURN-BAKING.

Darnel Grass

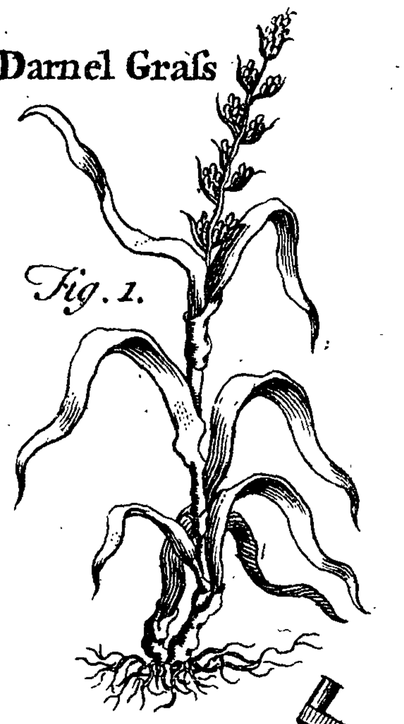


Fig. 1.

View of the Single Cultivator.

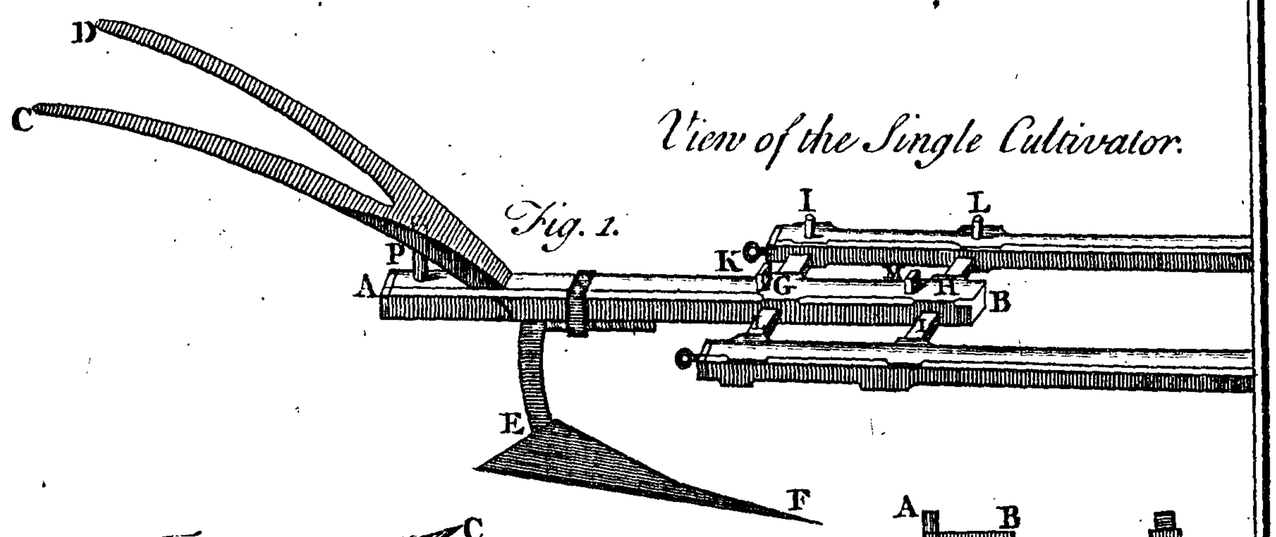


Fig. 1.

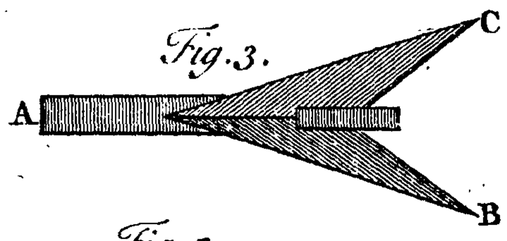


Fig. 3.

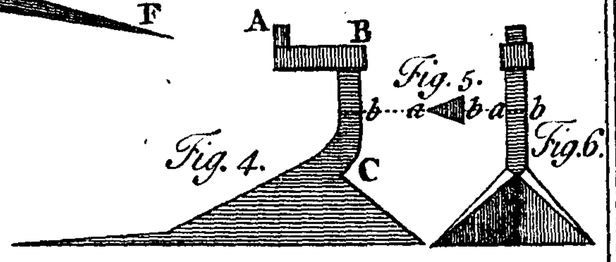


Fig. 4.

Fig. 5. *Fig. 6.*

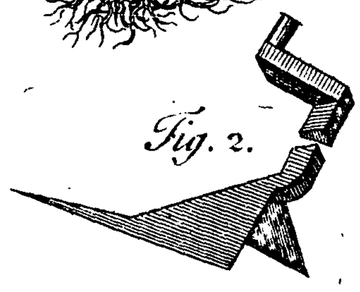


Fig. 2.

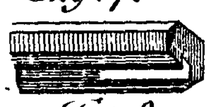


Fig. 7.



Fig. 8.

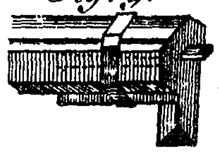


Fig. 9.



Fig. 10.



Fig. 11.

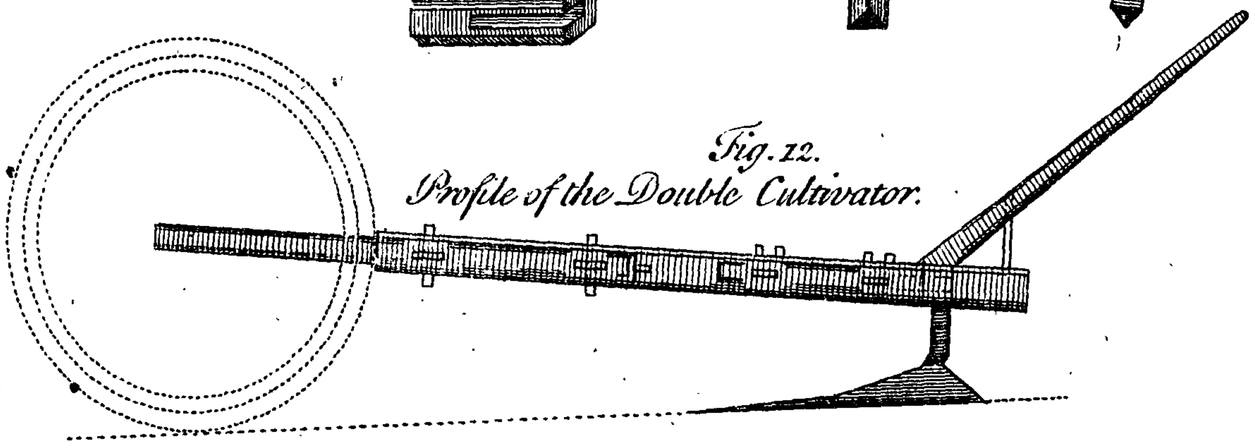


Fig. 12.
Profile of the Double Cultivator.

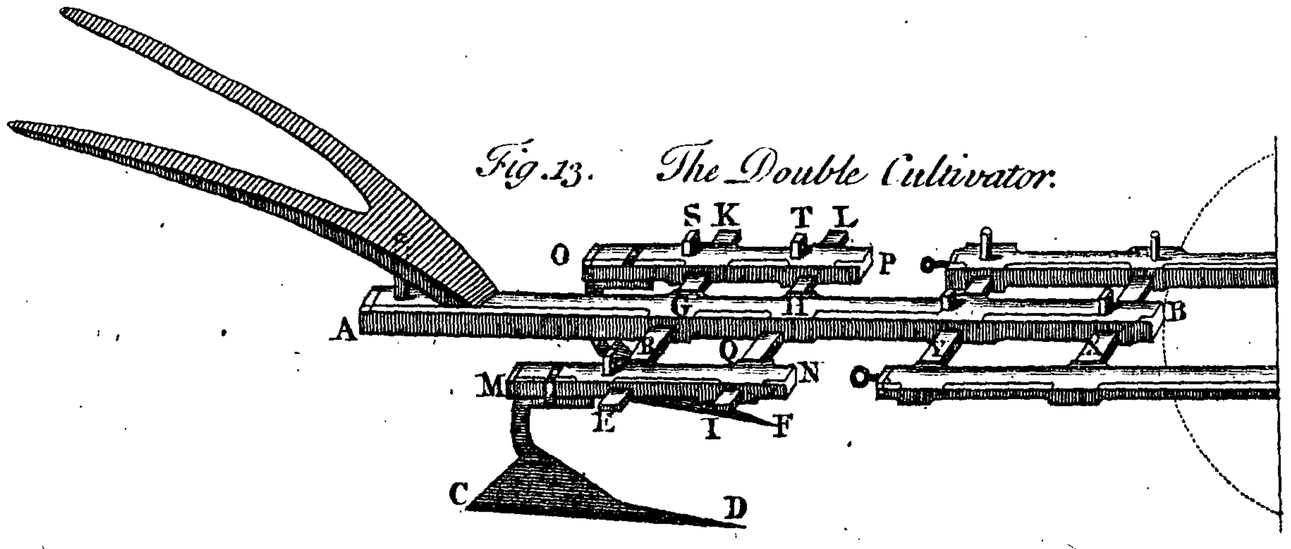
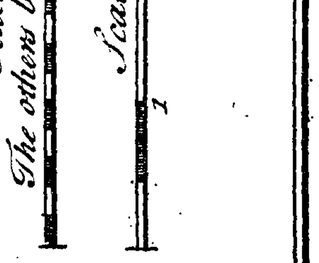


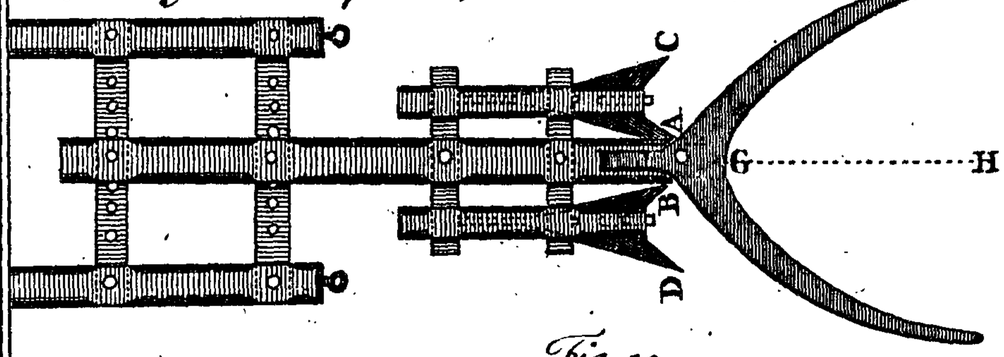
Fig. 13. *The Double Cultivator.*



Scale of 3 Feet for Fig. 4. 5. 6. & 7.
The others being seen in Perspective, require none.

Scale of 6 Feet for Fig. 5.

Fig. 14. Geometrical plan of the Double Cultivator



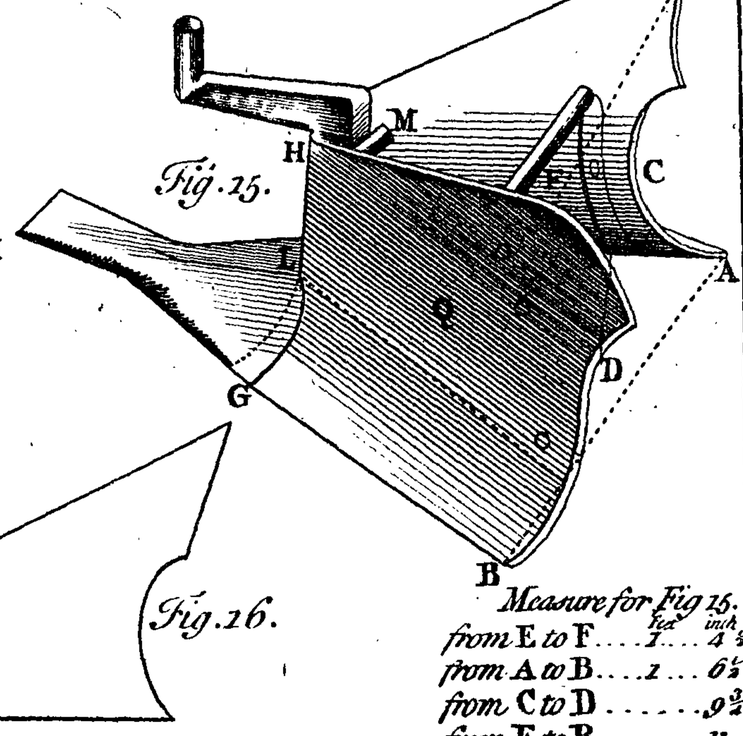


Fig. 15.

Fig. 16.

Measure for Fig 15.

	feet	inch
from E to F	1	4 1/2
from A to B	1	6 1/2
from C to D		9 1/2
from F to B		11
from G to H		9 3/4
from F to H		7

Fig. 18.

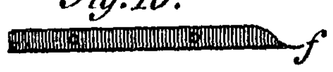


Fig. 19.



Fig. 20.

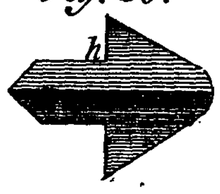


Fig. 22.



Fig. 17.

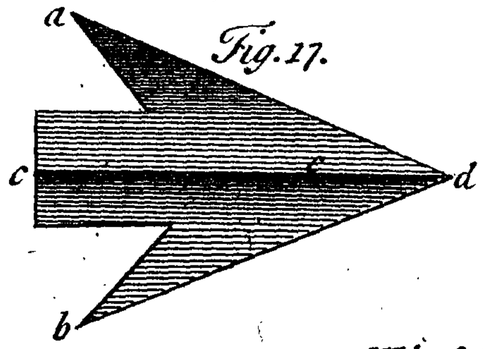
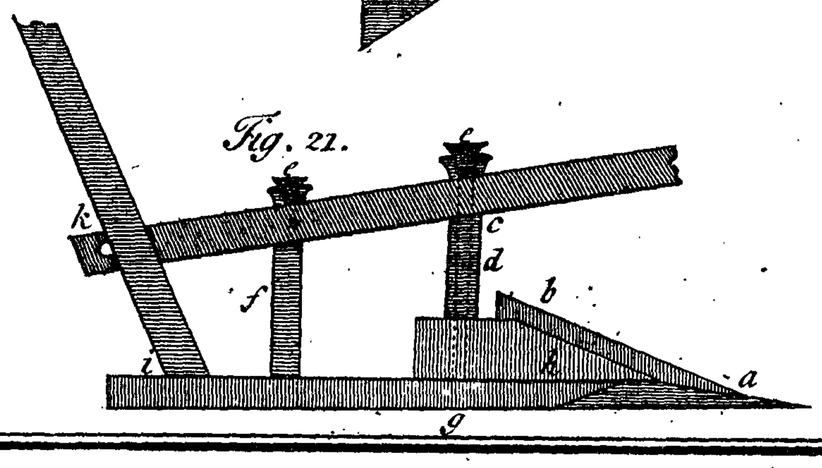


Fig. 21.



J. Hulett sculp.

DEVIL *in a buſh*, or *fennel flower*, a very troubleſome weed among the corn, eſpecially in Italy, France, and Germany, where it abounds much more than in this country. It riſes with ſlender ſtalks, near a foot high, which ſometimes branch out at the bottom, and ſometimes are ſingle, garniſhed with a very few fine cut leaves, ſomewhat like thoſe of dill. Its flower is generally blue, and its ſeeds are rough and black. This, together with their being nearly of the ſame ſize as the grains of wheat, renders it difficult to ſeparate them from the corn, when the plant has been cut and houſed with it; they blacken the meal, and debaſe its value. The plant is annual, and therefore may be extirpated by rooting it out before it can ſeed, which is commonly in Auguſt.

DEVIL'S-BIT, the name of a weed often found among the corn, but more frequently in meadows. It has a ſtrong, thick, fibrous perennial root, which runs deep into the ground, and ſends out ſeveral branching ſtalks, which riſe near three feet high. The lower leaves are ſometimes almoſt entire, and at others they are cut into many ſegments almoſt to the mid-rib: they are ſeven or eight inches long, and from three or four broad in the middle, hairy, and ſit cloſe to the root. The ſtalks are covered with ſtiff, prickly hairs, and garniſhed with ſmaller leaves at each joint. The flowers, which are of a pale purple colour, and have a faint odour, appear in June upon naked foot ſtalks at the end of the branches, which decay to the root every autumn.

DEVIL'S-GUTS, the ſame with the leſſer bindweed. *See the article* BIND-WEED.

DEVONSHIRING. *See the article* BURN-BAKING.

DEW, the moiſture perceived on the ground, and on the leaves of plants, blades of graſs, &c. in the morning.

Thoſe who have made no other reflections on dew than ſuch as preſent themſelves naturally, think that all the moiſture one finds in the morning on plants and upon the ground, comes in reality from above; but when the affair is examined with more attention, one ſees that at leaſt a great part of the dew ariſes from the earth itſelf and the plants, and keeps hanging to their ſurface. Mr. Gerſten, who hath made a diſſertation on this ſubject in particular, hath even thought that there fell no dew from above on the ground, and that all which we ſee under the form of dew aroſe from the earth or plants, on which it keeps hanging in pearls till the heat of the day hath diſperſed it.

For the nature and properties of dew, with regard to vegetation, *See the article* ATMOSPHERE.

DEWLAP, the fleſh that hangs down from the throat of oxen.

DIABETES, a morbid copiouſneſs of urine, or the making water in too great quantities. This diſorder is very common in horſes, and often terminates in death.

Horſes ſubject to a diabetes, or profuſe ſtaling, if old, or of a weak conſtitution, are ſeldom cured; they ſoon loſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes; but he muſt not be indulged with too much water, or moiſt food. At the ſame time give him the following drink:

Take jeſuit's bark, four ounces; biſtort and tormentil-root, of each two ounces: boil them in two gallons of lime-water to the conſumption of half, and give a pint three times a day.

Let the horſe drink two or three quarts a day of lime-water; and if theſe medicines ſhould not ſucceed, give a quart of ſtrong alum-poſſet, three or four times a day.

This method is proper alſo for a horſe who ſtales blood; or the following balls may be given for that purpoſe, if the bleeding is profuſe.

Take bole armoniac one ounce, Japan earth half an ounce, roach alum two drams, elixir of vitriol one dram; make them into a ball with conſerve of roſes, and give it every ſix hours.

As this diſorder generally proceeds from too violent exerciſe, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up. *Bartlet's Farriery, p.* 165.

DIAPHRAGM, midriff, or ſkirt, as ſome call it in a horſe or bullock, is a muſcular ſubſtance that divides the upper cavity or cheſt from the lower belly.

DIBBLE, a ſetting ſtick, or inſtrument to make holes in the ground for ſetting plants, &c.

DIG, a mattock. *See* MATTOCK.

DIGGING, the act of turning up the earth with a ſpade.

Was labour conſiderably cheaper in England than it is at preſent, and a ſufficient number of hands could be found, it would doubtleſs be the beſt way to dig by hand all the ground deſtined for potatoes, carrots, lucern, &c. many advantages would accrue from this method of tillage; the earth would be looſened to a greater depth, and much better pulveriſed; nor would the weeds and graſs be ſo apt to grow as in ploughed lands.

DIGITATED, branched out into diviſions like fingers.

DIKE, a ditch. It alſo ſignifies a dam or mound to hinder inundations.

DINGLE, a ſmall clough or valley between two ſteep hills.

DITCH, a trench cut in the ground, uſually round the fences of a field.

The mud of ditches affords an excellent manure, as it conſiſts of the putrid particles of animals and vegetables, mixed with the fineſt and richeſt mould; and therefore proves a great improvement to any ſoil, particularly the light and dry. But this mud ſhould be expoſed to the air for ſome time, that the ſeeds of the weeds generally contained in it may have time to vegetate or putrify, before it be laid on the land.

DOCK, the name of a weed, of which there are ſeveral ſpecies, and all of them remarkable for the largeneſs of their leaves; ſo that he muſt be a very ſlovenly farmer who ſuffers any of theſe plants to grow large. They ſhould be plucked up by the roots as ſoon as they appear, which may eaſily be done, as the roots are of the tap, or carrot kind.

DOCKING, the act of cutting off the tails of horſes.

This operation is in general very ſucceſsfully executed, by the common methods, which are known to every farrier. But ſometimes a miſcarriage enſues by an inflammation and gangrene ſucceeding. Theſe accidents probably ariſe from the tendons of the tail ſuffering by an injudicious application of the knife or ſearing-iron, or in an improper ſeaſon for the operation. Neither the very

hot or cold months are proper, for reaſons ſufficiently obvious. The operation ſhould always be performed by inciſion, or the chopping engine; the knife being paſſed through the tail from above, whilſt it lays on the block; for when the cutting inſtrument is applied underneath, the blow is given on the tail, which, by bruſing the tendons, may be naturally ſuſpected to occaſion bad ſymptoms. The ſearing iron ſhould be ſmooth, and better poliſhed than thoſe generally uſed, and ought to be rubbed clean with a wollen-cloth, before it be applied to the ſtump; otherwiſe the ſparks, which fly from the iron, are apt to occaſion great pain, attended with the ſwelling both of the ſheath and fundament: nor ſhould it ever be applied flaming hot, for then it brings the burnt part away with it, and requires a re-application, in order to form a freſh eſchar on the veſſels; by which means the bone is frequently left too much expoſed, ſo that it is often a conſiderable time before it is covered.

Farriers ſeldom apply any thing to the ſtump; which need only be anointed with the wound ointment, and when the eſchar is digeſted off, may be waſhed with allum or lime-water: but if an inflammation enſues, with a diſcharge of thin matter, a proper digeſtive, compoſed of Venice-turpentine, rubbed with the yolk of an egg and tincture of myrrh, ſhould be applied, with a poultice of bread and milk over it. The rump ſhould be frequently bathed with oil of roſes and vinegar, and a large quantity of blood taken away. If the fundament be at all ſwelled, and the inflammation at all ſuſpected to be communicated to the bowels, let cooling emollient clyſters be injected two or three times a day. Should a gangrene enſue, add Ægyptiacum to your dreſſings, and ſpirits to the fomentation: and apply over all the ſtrong-beer poultice, with London treacle, twice a day. *Bartlet's Farriery, p.* 323.

DODDED *Sheep*, ſheep without horns.

DODDER, the name of ſo remarkable a plant, that it cannot eaſily be miſtaken. It is entirely without leaves, and does not depend upon the ground for nouriſhment; but when it is grown up, rots at the bottom, and lives upon the juices of other plants about which it entwines itſelf, by means of threads of a red colour, which it throws out. The flowers are ſmall, and come out in roundiſh heads or bunches, many of them together, here and there, from the ſtem.

DODMAN, a name given in ſome of the northern counties to the ſhell-ſnail.

DODRED *Wheat*, red wheat without beards.

DOG's *Graſs*. *See* COUCH GRASS.

DOKE, a deep furrow.

DOLE, or *Dool*, a long narrow green in an arable field, left unploughed.

DOLPHIN-*Fly*, the name of an inſect very deſtructive to beans. *See the article* BEANS.

DOOL, the ſame with dole. *See* DOLE.

DOSOME, an epithet applied to ſuch beaſts as improve apace. Thus a thriving beaſt is called, in the northern counties, a doſome beaſt.

DRAGS, a name given in ſome counties to the heavieſt pair of ox-harrows.

DRAFFE, the grains of malt.

DRAIN, a channel, or trench, cut in the earth, in order to carry, or drain off the water. *See the articles* BOG, MARSH, and MOOR.

When coarſe graſs is produced, the ground is evidently overcharged with moiſture, proceeding either from cold, hungry ſprings, loaded with ſome mineral or acid, which want vent; or elſe from external floods, which, being confined by a ſtiff clay, impervious to water, remain upon it, and corrupt the natural nouriſhment proper for producing the ſweet and richer graſſes. When this laſt is the caſe, the remedy is eaſy, by making proper drains to carry off the ſuperfluous moiſture. But if the land be ſpouty or ſpewy, as it is commonly termed, and the moiſture ariſes from ſprings, a deep drain muſt be cut in the loweſt part, and ſmaller drains from that principal ditch to ſuch places as appear to be the heads of the ſprings, which will be known by their being wetter and looſer than other parts. The drains muſt be cut deep enough to reach the bed, whether gravel or ſand, through which the water flows; and upon the firſt touching of this, the water will be found to run off more freely, and in greater quantity.

The ſmaller drains, communicating with the main ditch, ſhould be left open for ſome time, until the quantity of moiſture abates. After this, to make them covered drains, by which the ſurface is rendered level, and no part of it is loſt, they ſhould be filled up with ſmall ſtones to within about a foot and a half of the ſurface, and then covered with turf, the green ſide downwards, or with heath, broom, ſtraw, or any other thing that can moſt conveniently be had, proper to keep the earth from falling in among the chinks of the ſtones, through which, if no ſuch accident happen, the water will paſs eaſily, the drains will prove effectual, and the plough, after the earth that was turned out is laid above all, will go freely over, without being oppoſed by the ſtones. A foot depth of mould over the drain will be ſufficient in paſture-ground; but this covering ſhould be at leaſt a foot and a half thick in ploughed lands. Where ſtones are ſcarce, faggots made of the branches of any kind of trees are ſubſtituted in their place: but they do not anſwer the purpoſe ſo well, becauſe they decay and rot, the earth falls in, and the drains are ſtopped: though it is highly proper, where theſe are uſed, to line the ſides of the drains with brick or ſtone, without mortar, to keep the earth from falling in there, and at the ſame time give free admittance to the water. It muſt be obſerved, that, where a great quantity of water is to be diſcharged, the main drain into which the ſmaller drains are to empty themſelves, ſhould not by any means be filled up, even with ſtones, unleſs it be both very deep and very wide, and there be a great quantity of ſtones to throw into it, leſt it ſhould not be able to diſcharge all the water; in which caſe the whole work will prove worſe than uſeleſs; a remedy being very difficult on account of the ſtones.

The beſt time of covering theſe drains is about Michelmas; becauſe the earth is drieſt at that ſeaſon, before the winter rains begin to fall. The digging of them indeed is very laborious work, particularly in marſhes, the ſoil of which is always of a tough, ſtrong quality. It is therefore of great importance, that every means be uſed to leſſen that fatiguing labour. The ſhovels and ſpades univerſally uſed, are certainly too ſhort. Their length ſhould be ſuch as to give the labourer every advantage ariſing from his own ſtrength. In order to have this, he ſhould ſtand as erect as poſſible; for otherwiſe, he has not only the weight of the earth on the ſpade or ſhovel to raiſe, but alſo that of his own body; whereas if the ſhovel be of a due length, an eaſy ſhifting of the lower-moſt hand

hand becomes a prop, or point, on which the weight at the end is raiſed, almoſt without bending the body.

Where the ground in which the ſprings are lies on a gentle declivity, Mr. Tull very properly adviſes ploughing it nearly horizontally, by which means each furrow carries off the water, which would otherwiſe ſink into the next ridge. If the clay underneath be at ſo ſmall a depth that the plough can reach it, this will have a very good effect: and as the nearly horizontal direction of the furrow gives the water but a ſlow motion, it will not be ſo apt to waſh away the richer mould, as it would if the furrows were more perpendicular to the declivity. Theſe furrows ſhould, however, have ſlope enough to give the water a current ſufficient to prevent its ſoaking into the ridge underneath.

If the ſprings riſe only at the bottom of a ſloping ground, one large drain, reaching the whole length of the declivity, and cut down to the bed of clay underneath, may be ſufficient, with the help of a channel, to carry off the water.

If there is any mineral in the earth, eſpecially a chalybeate, which Dr. Home has experienced to be very prejudicial to vegetation, ſuch mineral, being waſhed out by the ſprings, is lodged in the ſoil, towards the ſurface.

DRAINING *of Land*, the operation of carrying off the water from wet lands. *See the articles* BOG, MARSH, MOOR.

A correſpondent of the editors of the Muſeum Ruſticum has obliged the public with the following obſervations on the uſes of draining.

"The firſt experiment," ſays he, "I made, was upon a piece of ground of about four or five acres, in the front of my houſe, of the ſpringy kind; where the waters, collected from the rains and dews in a large plain of dry land above, broke out upon the declivity of the hill, and not having proper drains and channels, to carry them away, had, by long overflowing, rendered the ground ſo ſoft and boggy, as not to allow the tread of any ſort of cattle, (unleſs in very ſevere froſts,) and thereby made it intirely uſeleſs, and alſo very diſagreeable to the eye. I took the opportunity of a very hard and laſting froſt, to carry on a large quantity of ſtones for making the intended drains: which were laid out in the following manner. A main drain, or trench, was made through the middle of the ground from a ſmall rivulet (into which it was to empty itſelf) to a little above where the ſprings made their firſt appearance: from thence two drains (one on each ſide) were carried along the ſide of a hill to the two extreme parts of the ground, emptying themſelves into the head of the firſt mentioned drain, which was only made about three feet deep till near the top of it. The branches or ſide drains were better than ſix feet, as I hoped thereby to have cut off all the ſprings: but the declivity of the land being conſiderable, I was obliged to add two drains more below: as ſome of the ſprings had eſcaped under the bottoms of the higheſt branches. I made the drains in the following manner. The bottoms were flagged with a thin tender ſtone (of no other uſe;) the ſides walled with rubbiſh ſtone (the walls being about five inches aſunder, and five inches high;) and the tops covered with a ſtronger kind of rubbiſh ſtone. Upon the covers I laid ruſhes and reeds, (the then only produce of the ground) to prevent any dirt or ſoil from getting through the openings of them into the drains; and, laſtly, I filled them up with the moſt porous ſubſtances, dug out to near the height of the ſurface.

"I began this work about the end of March, and had finiſhed it about the end of Auguſt. I very ſoon found the good effects of my labour, the ground being grown ſo hard and ſolid before the middle of October, that I was able to carry on, with carts, a very large heap of compoſt, which I had prepared ready for that porpoſe; conſiſting of freſh litter from the ſtables, virgin earth, ſtreet dirt, coal aſhes, and lime, well incorporated together by frequent turnings. The next ſummer moſt agreeably ſurpriſed me with as fine a crop of hay, both in reſpect of quantity and quality, as any of the neighbouring grounds could boaſt, (above three loads to the acre:) and the aftermath, or ſecond crop, was full as extraordinary as the firſt. In order to know the profit of the latter exactly, I hurdled it off in ſmall parcels: and, having taken in cattle by the week, found the profit better than twenty ſhillings a ſtatute acre. This ground has kept improving ever ſince; and now affords me three crops every year; viz ſpring paſturage for my milch-cows and early feeders, a moſt plentiful crop of good hay, and an excellent aftermath; without having had any ſuperinduction beſtowed upon it ſince the firſt, which is eleven years ago. When ſtones cannot be conveniently had, the common flat tiles for the bottoms, and the common brick for the ſides, and covers of the drains, will do very well; and, as bricks are more expeditiouſly laid than the rubbiſh-ſtones, I think they will be full as cheap, if proper clay, and fuel for burning them, can be procured upon eaſy terms. The expence of draining this piece of ground was about five pounds per acre. I have drained many acres of the ſame kind of land ſince, with equal ſucceſs; and at a much leſs expence. Another kind of land, which has fallen within my practice of draining, is what I call the ſour ſpongy land; where there is upon the ſurface a tolerable good mould, for ſix or ſeven inches deep, and below that a ſtiff clay, that will not permit any water to paſs through it; by which means, the ſoil above is ſo ſoaked and chilled, with a conſtant ſurcharge of water, that it is not able to produce any thing but ruſhes, and all the worſt ſpecies of aquatic weeds. As this kind of land is often nearly level, or but gently declining, the firſt ſtep I take, is (by levelling) to find the greateſt fall I can get within any reaſonable diſtance. Then, by the means of iron-rods, (ſuch as are uſed in boring for coals) with a bitt or iron ſcoop at the bottom, I try in ſeveral places the depth of the clayey ſtratum, which ſo obſtructs the paſſage of the water; and alſo what the natures of the ſeveral ſtratums below it are, till I come as low as the level, where I propoſe to begin my drain. If I find, in ſuch ſearch, gravel, ſand, ſoft-rock, pinnel, or other porous ſubſtance, I begin the good work immediately, and with full aſſurance of ſucceſs: making a good ſtone or brick drain (as before deſcribed) through the loweſt part of the ground intended to be drained; and then filling it up with the light porous ſubſtances, that ariſe it the digging of it, or any rubbiſh that can be conveniently procured; taking great care that none of the clay, or hard ſubſtances be thrown in again; and that the top and ſides of the drain be left lower than the reſt of the land; that the winter rains may eaſily deſcend to it, and ſo paſs (as through a ſieve) into the channel prepared to receive them. If there be any low parts in the piece of ground,

ground, from whence the rain-water cannot deſcend to the main drain, ſmall pebble, or wood drains, ſhould be made from thoſe low parts into it: taking care to fill them up with ſome rubbiſh or light mould. The clay, which is dug out, may be converted (either by burning or laying up in heaps with quicklime) into a moſt excellent tillage, either for corn or graſs land, for the improvement of the ſame ground, or any other where it is more wanted. For the fertility of ſuch land, after ſuch draining, is greater than can be well imagined by thoſe who have not tried it, even without any farther improvement. I generally (indeed) ſet on lime immediately afterwards, if the ſeaſon of the year be proper for it; which, I ſay (from experince) is from the middle of April, to the middle of July; being certain, (notwithſtanding ſome great authorities, and the common practice are againſt me) that twenty buſhels ſet upon graſs-land, during that ſeaſon, are more than equal to thirty laid on in the autumn, or winter ſeaſons. About an hundred and ſixty buſhels to an acre are a proper dreſſing. The laſt kind of land, of which I ſhall now treat, is the black peat or mooriſh land, many thouſand acres of which, in this kingdom, are now intirely uſeleſs, though capable of being improved to great advantage. Nay, I will venture to affirm, that there is ſcarcely any ſo bad, but that it might, by proper means, and due induſtry, be converted to ſome uſeful purpoſe. For which aſſertion, I have a happy authority, in that beautiful teſtimonial of induſtry, given by Virgil, in his fourth Georgic, to the old Corycian farmer. If theſe kinds of land be nearly upon a level, I uſe the precautions mentioned in the laſt article; and, if I find my level will carry me below, or to the bottom of this black mooriſh or peat-earth, I do not regard the depth of my drains, as the digging is very eaſy, and what is thrown out will nearly pay the expence, by being either dried into peat for fuel, or burnt into aſhes; which, if properly managed, are an excellent dreſſing, either for ſpring-corn, or graſs-land. In the draining of this kind of ground, I make one principal drain through the middle of the piece, (of ſtone or bricks, as before mentioned) and, at about every eighty or a hundred yards, branches from it. Theſe I make rather better than two feet wide at the top; and continue them nearly of the ſame width, till within eight or nine inches of the bottom. Then, with a ſpade (about nine inches broad at the top, and narrowing down to three inches) I make a lower drain; and, upon the ſides or ledges (formed by the narrowing of it) lay large heath-ſods, cut ſquare, and exactly to the width of the upper part: by which means, a cavity is left for the water to run in. Upon thoſe ſods or covers, I throw bruſh-wood, or any kind of light trumpery: and, laſtly, I fill it up with the ſmalleſt of the black ſoil thrown out. Such is the preſerving nature of this black peat or earth, to all vegetables buried in it, that there is no doubt, but drains of this laſt kind will endure for ever, if they be laid deep enough. After the ground is drained and levelled, marl (if to be had near) ſhould be laid on; if not, ſand, gravel, or any kind of light earth. If the firſt, no other ſuperinduction will be required; but if any of the latter over it ſhould be ſpread, a cover of ſome of the fineſt black mould, that is pretty free from any ſtrings or fibres; and then a compoſt made of horſe-dung, coal-aſhes, earth, or clay and lime; and, laſtly, it ſhould be laid down either with graſs-ſeeds alone, or with barley (or oats) and graſs-ſeeds. I laid down a piece (drained and managed as above mentioned) about the beginning of Auguſt laſt, with white colver, yellow clover, and common hay ſeeds, and though the ſeaſon was ſo remarkably dry and hot, yet the young plants came up very well, and very thick, and, in this preſent ſevere froſt, it affords a verdure, not to be ſeen any where elſe in the neighbourhood; and the piece is conſtantly covered by my cattle, tempted by the look, and the ſweet food it affords them. I am now preparing about five acres of the ſame kind of land, to be laid down with barley and graſs-ſeeds in the ſpring; and hope (if the ſeaſon proves favourable) to have a good crop of both. I had no marl (or even clay) near, ſo was obliged to make uſe of ſand and gravel for my firſt ſtratum.

DRAINING-PLOUGH, a plough for cutting drains, in order to carry off the water from wet ſoils.

Several inſtruments have been invented for performing this neceſſary operation; but as none were found ſufficient to anſwer the intention of the huſbandmen, the Society for the Encouragement of Arts, Manufactures, and Commerce, propoſed a premium of fifty guineas for the beſt plough or machine, of the ſimpleſt conſtruction, that ſhould, with the leaſt force, cut a new drain one foot in depth perpendicular, one foot eight inches wide at the top, and ten inches at bottom; both ſides of the drain equally ſloping, and the earth to be equally thrown out on both ſides. In conſequence of this premium, ſeveral inſtruments for effecting this purpoſe were ſent in to the Society; but upon trial one was found much ſuperior to the reſt, and anſwerable to the ſociety's advertiſement: and in conſequence of which the premium was adjudged to the author.

This plough, of which we have given four figures on Plate VIII. was made by Mr. Cuthbert Clarke, at Belford, in Northumberland; and anſwered exceeding well in meadow-ground; but could not be drawn in a ſtiff clay with the force of eight horſes. Fig. 1. is a perſpective view of the whole inſtrument ſeen on one ſide. Fig. 2. another view ſeen in front. Fig. 3. a third view ſeen at the tail. Fig. 4. a ſection of the plough, to ſhew the diſpoſition of the three coulters.

Note. The ſame letters refer to the ſame parts in all the four figures; ſo that where any of the parts cannot be ſeen in that figure, the letters will not be found.

A, B, C, are the three coulters.

D, E, F, the nuts and ſcrews that faſten the coulters to the beams.

G, H, I, a wheel, or rather roll, which prevents the plough from going any deeper in the earth. This roll is divided into three parts, by circular pieces of iron, which project beyond the roll; and cut the turf into three parts. The coulters follow in the ſame tract, and finiſh that part of the work.

K, K, the centers on which the roll turns.

L, L, the nut and ſcrews which faſten the iron arbour in which the pivots of the rolls turn to the beams. Theſe arbours are kept in their proper places by means of the two iron braces *f*, *f*.

M, a large iron hook, to which the chain by which the inſtrument is draw is faſtened.

N, the tow chain, or that by which the plough is drawn.

O,

Mr. Cuthbert Clarke's Draining-Plough.

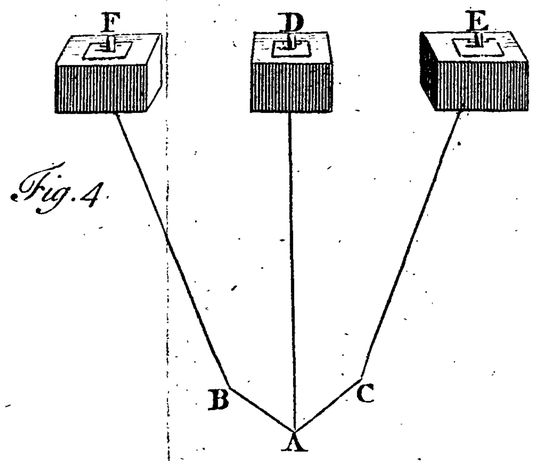


Fig. 4.

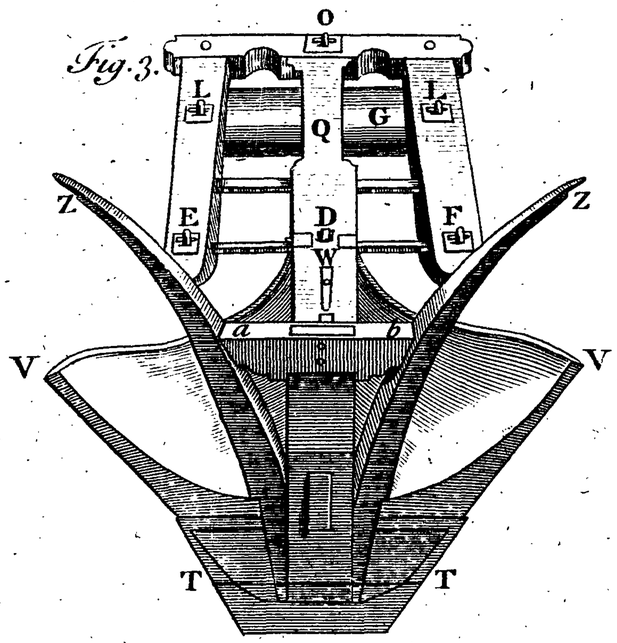


Fig. 3.

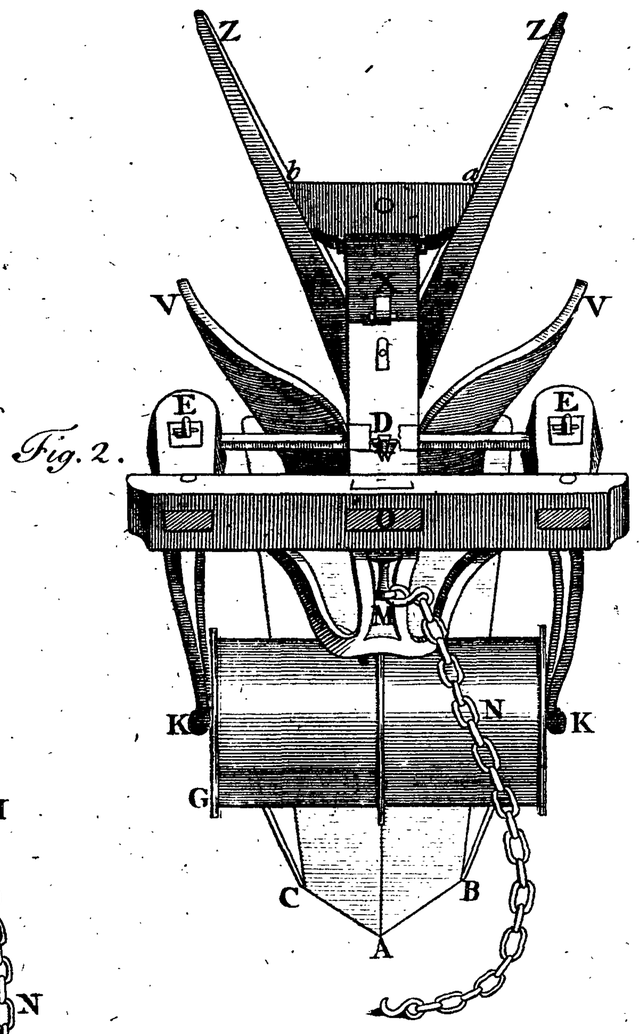


Fig. 2.

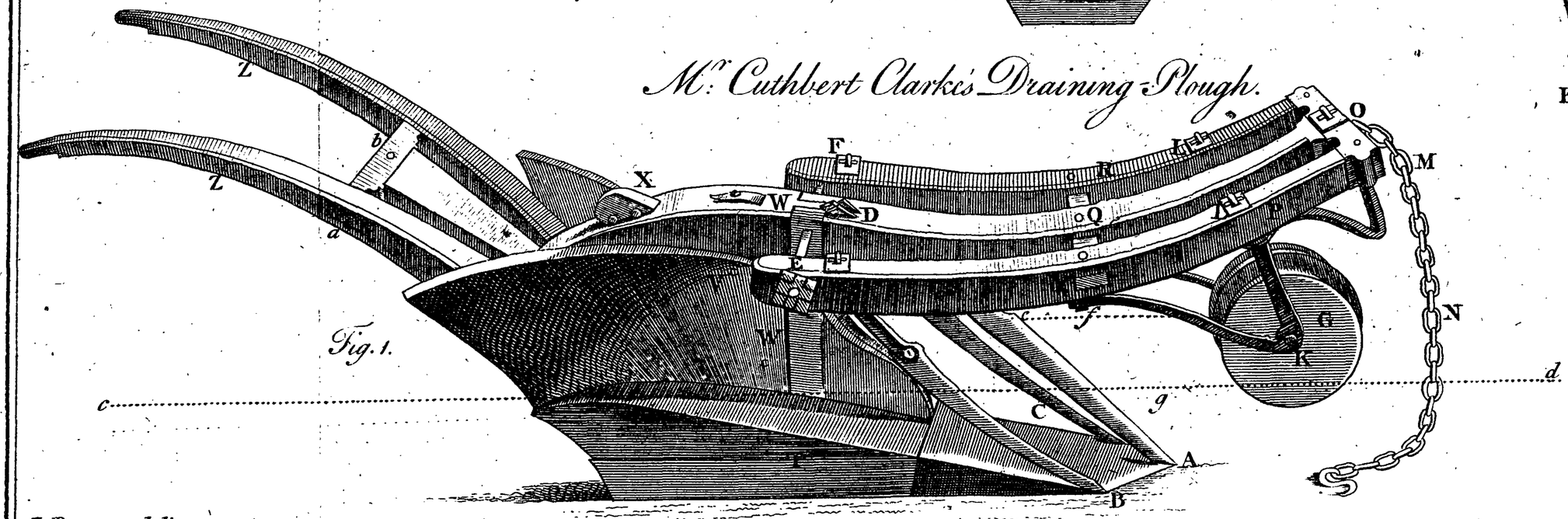


Fig. 1.

Fig. 1.

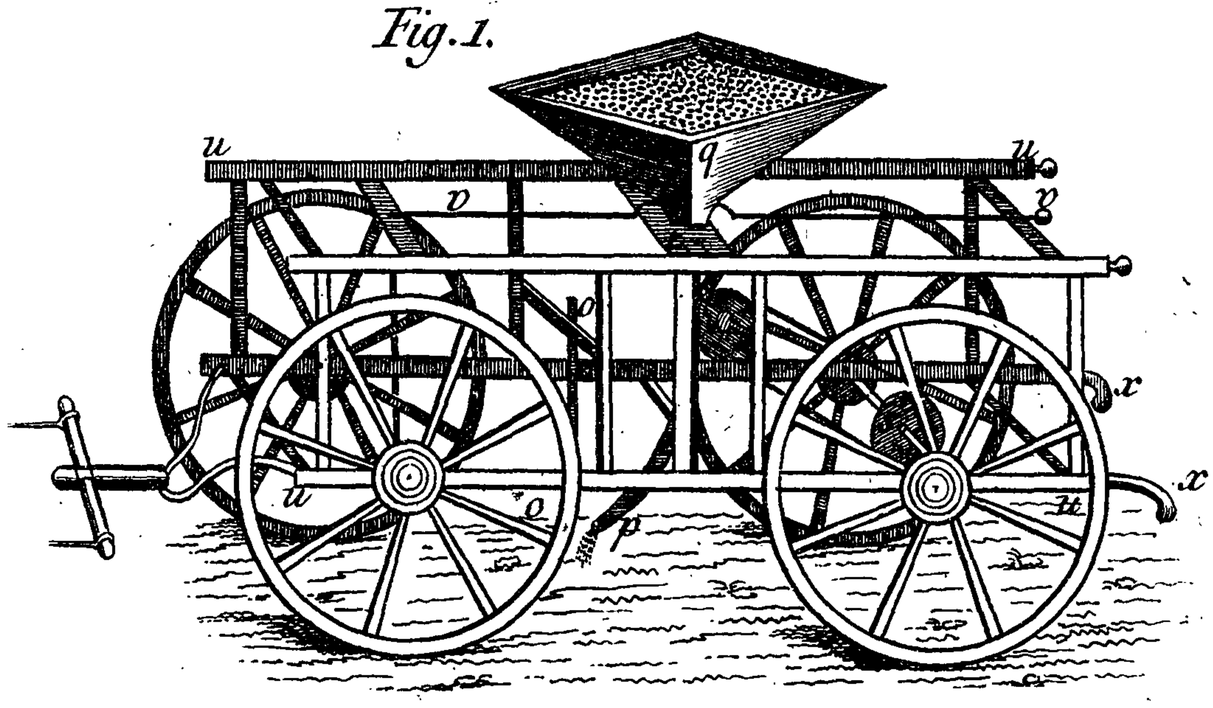


Fig. 2.

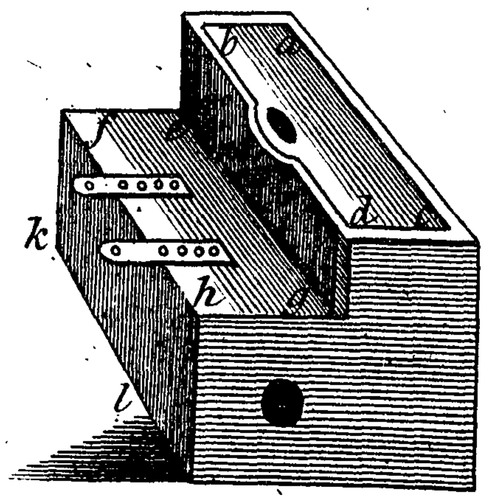


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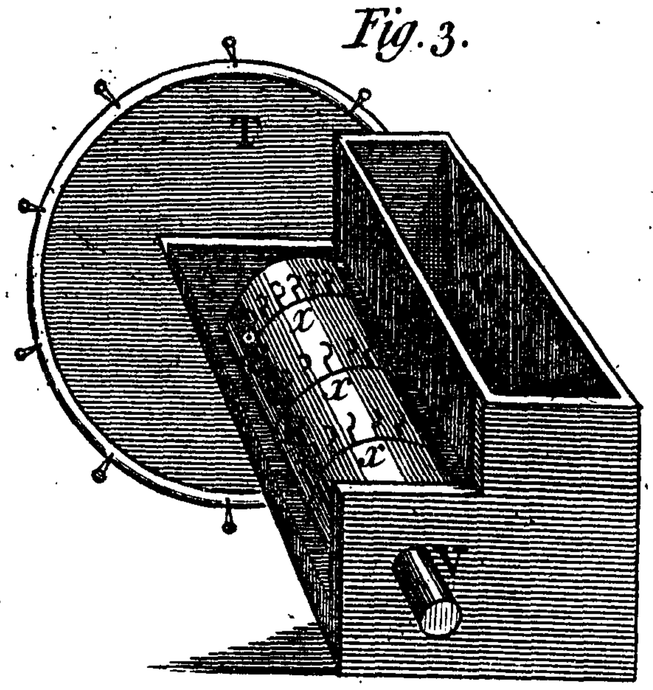


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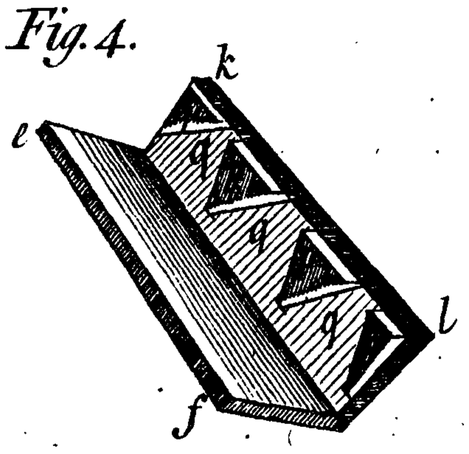


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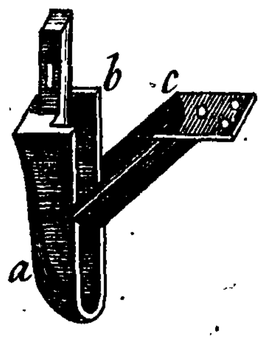


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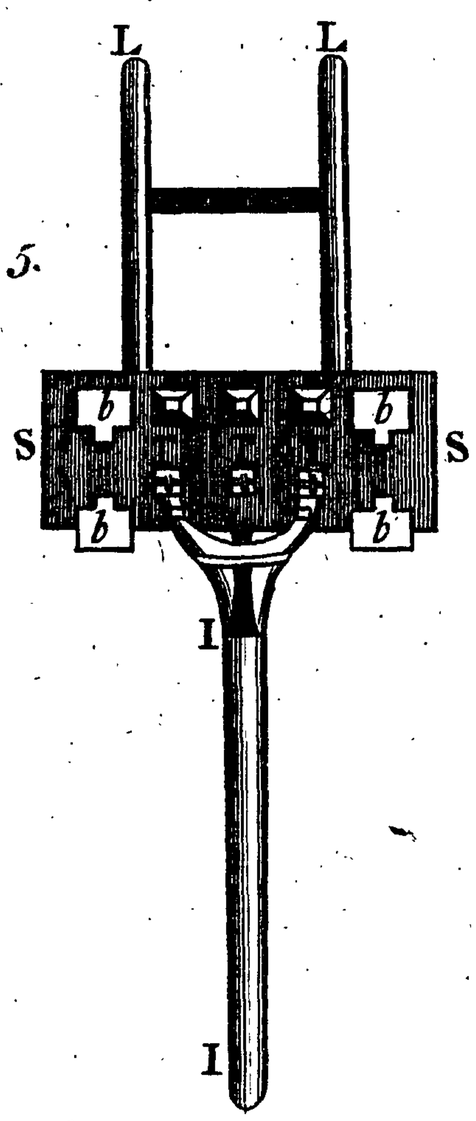


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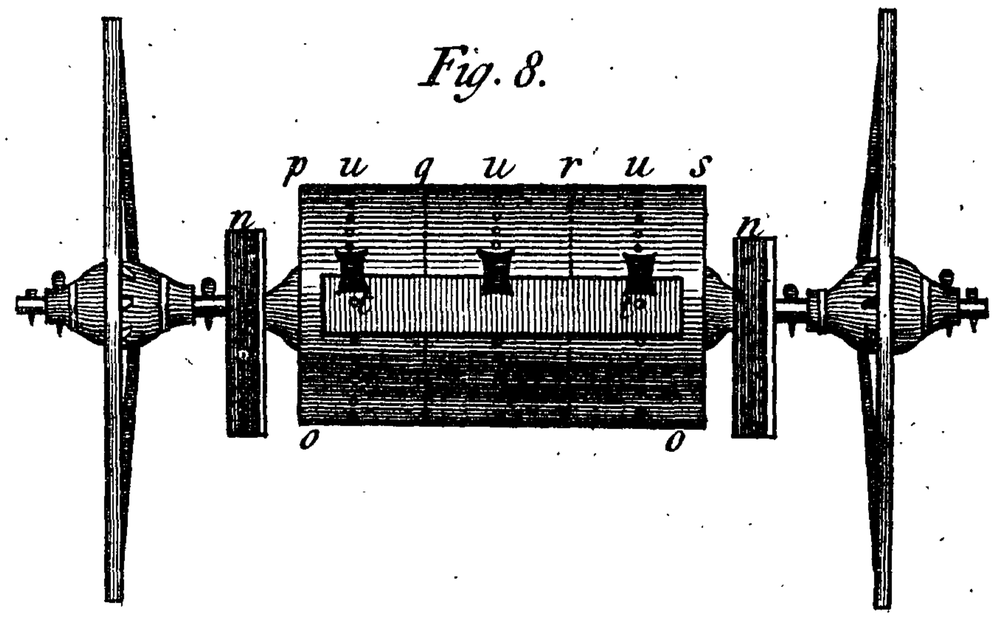
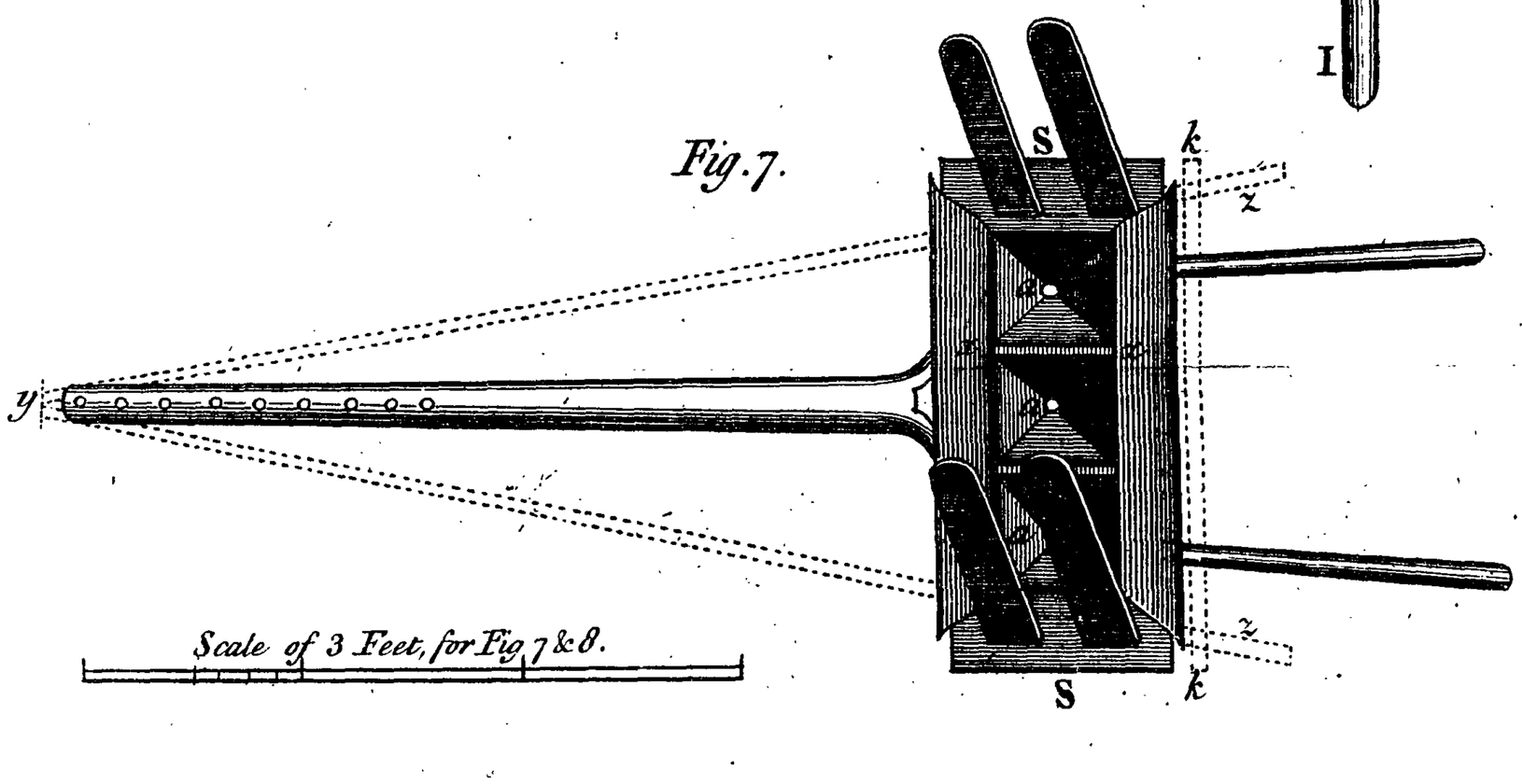


Fig. 7.



Scale of 3 Feet, for Fig 7 & 8.

J. Hulett sculp.

Fig. 11.

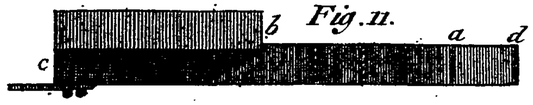


Fig. 4.



Fig. 9.

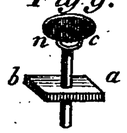


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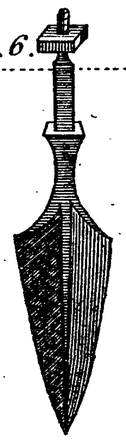


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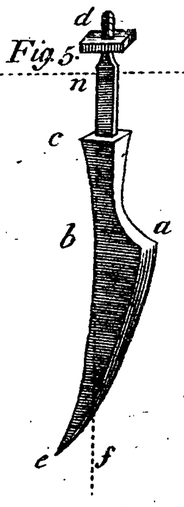


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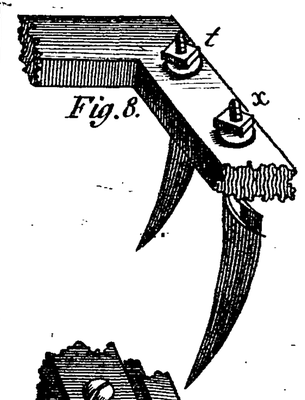


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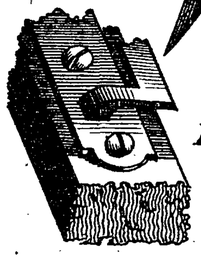


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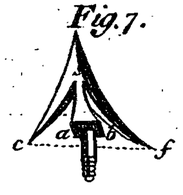


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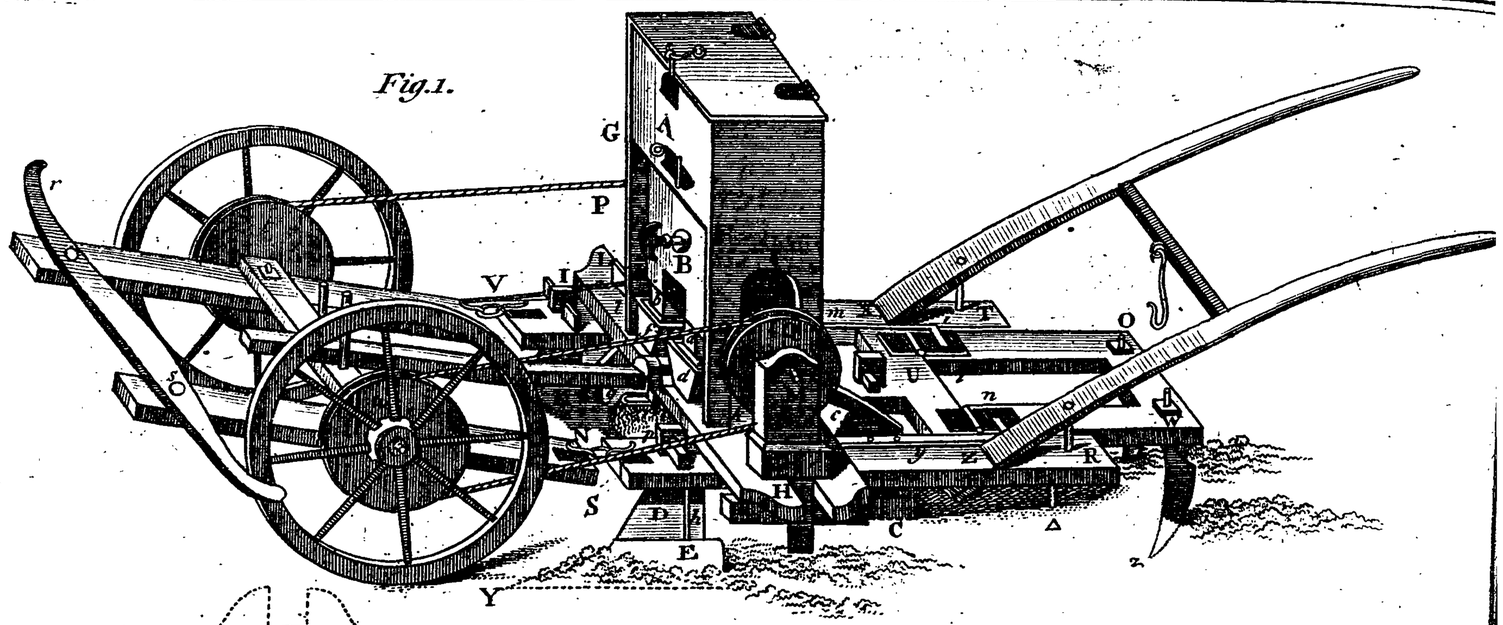


Fig. 2.

Scale for Fig. 2, 3, 4, 11, 12, 13, 14, 16, 17, 20, 24, 85.

1 2 3 4 5

Fig. 22.

Fig. 21.

Fig. 20.

Fig. 17.

Fig. 14.

Fig. 18.

Fig. 19.

Fig. 12.

Fig. 13

Fig. 15.

Fig. 16.

Fig. 23.

Fig. 30.

Fig. 3.

Fig. 25.

Fig. 31.

Fig. 27.

Fig. 26.

Fig. 28.

Fig. 24.

Fig. 29.

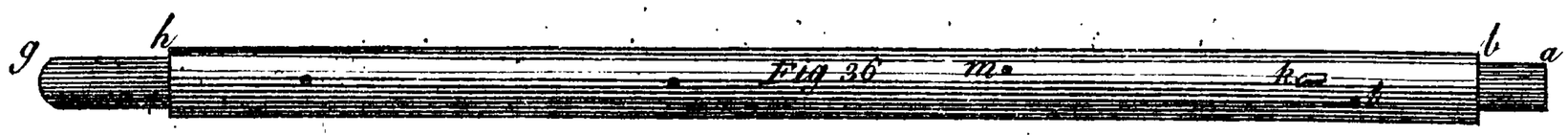
Fig. 34

Fig. 35.

Fig. 33

Fig. 32.

J. Hulett Sculp.



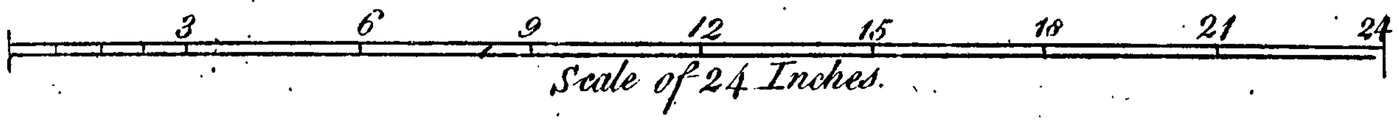


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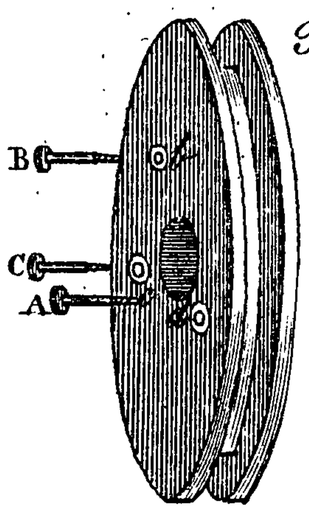


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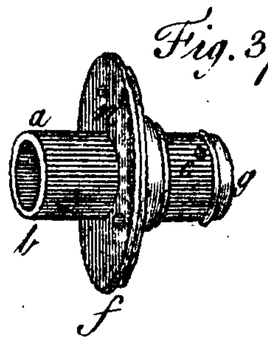


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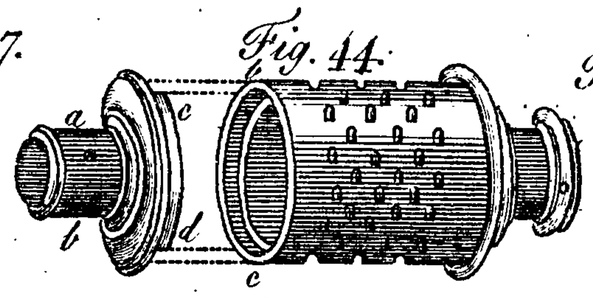


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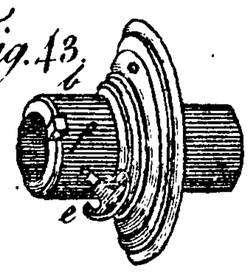


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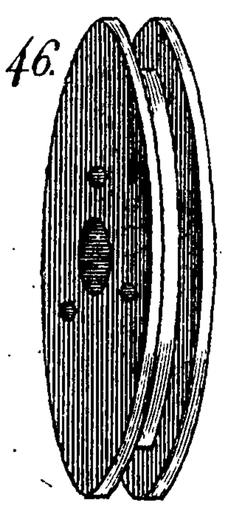


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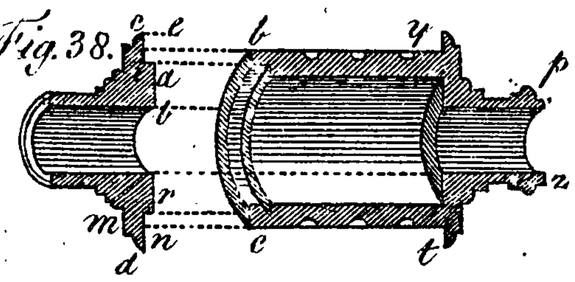


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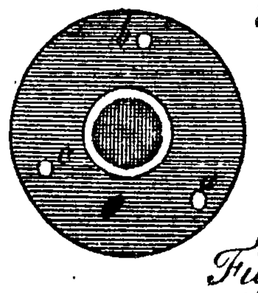


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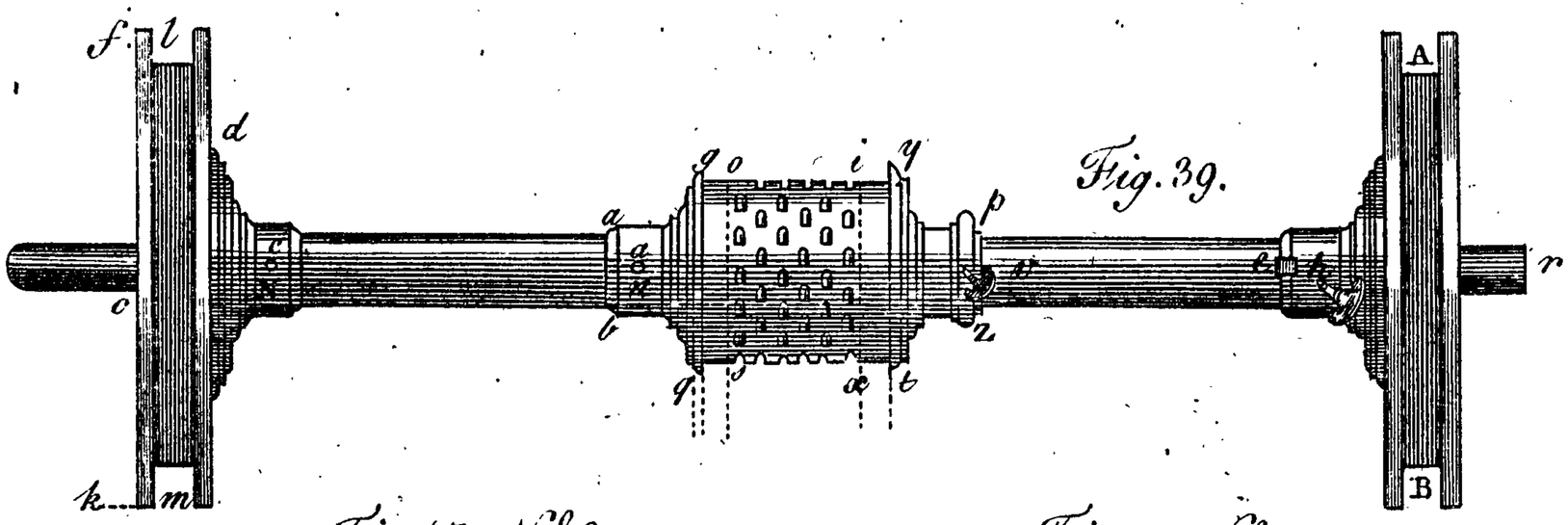


Fig. 39.

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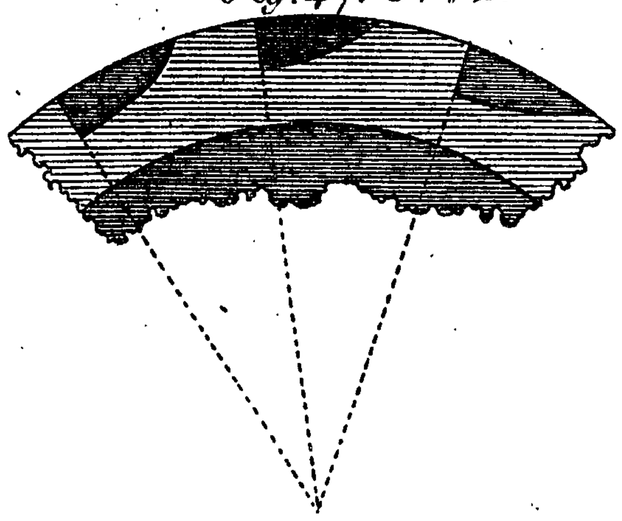


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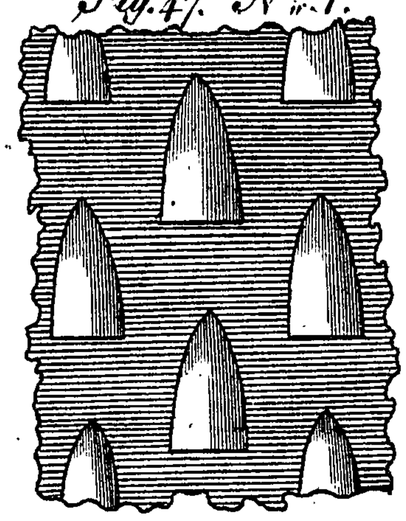


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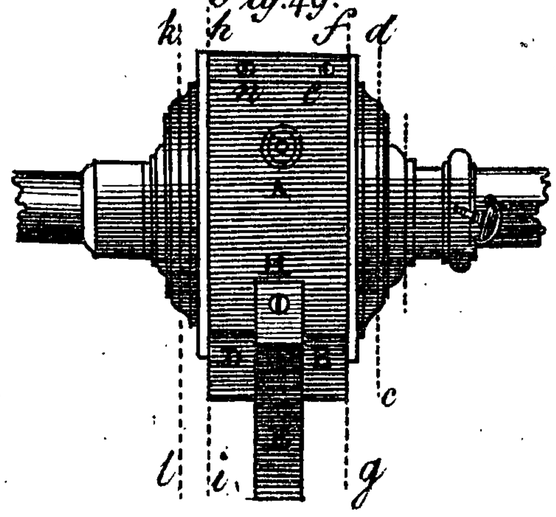
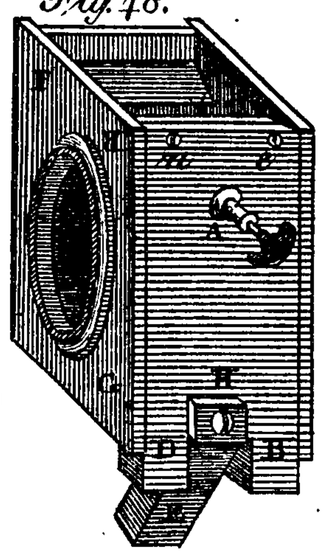


Fig. 48.



J. Hulett Sculp.

PLATE XIII.

Facing Drill Plough.

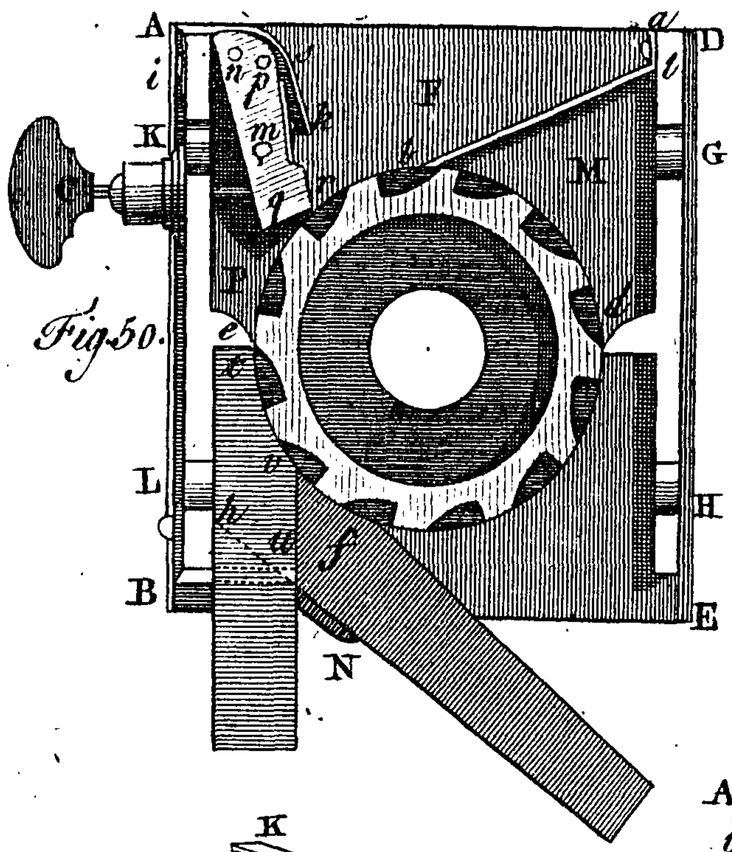


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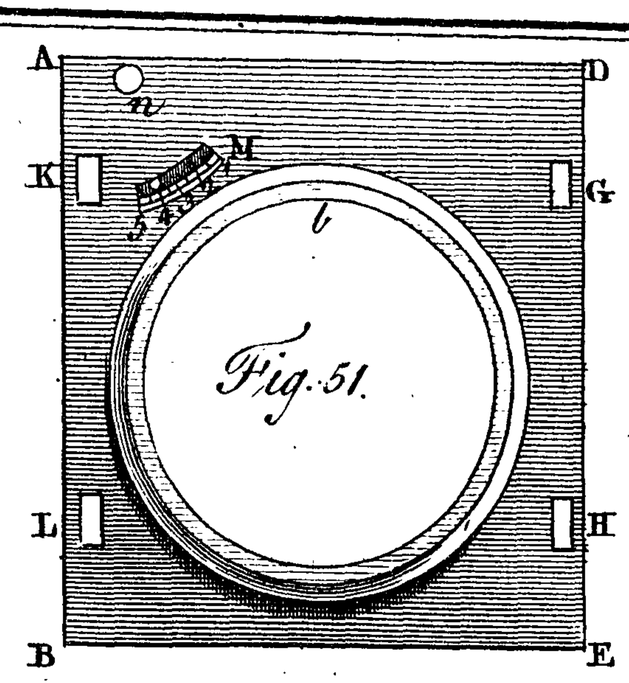


Fig. 51.



Fig. 54.

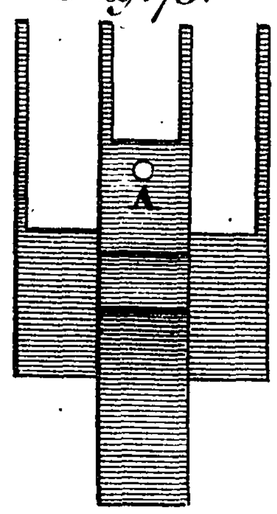


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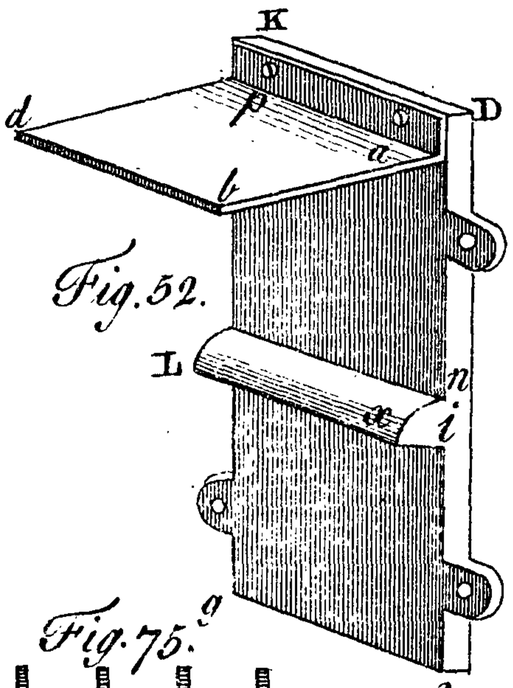


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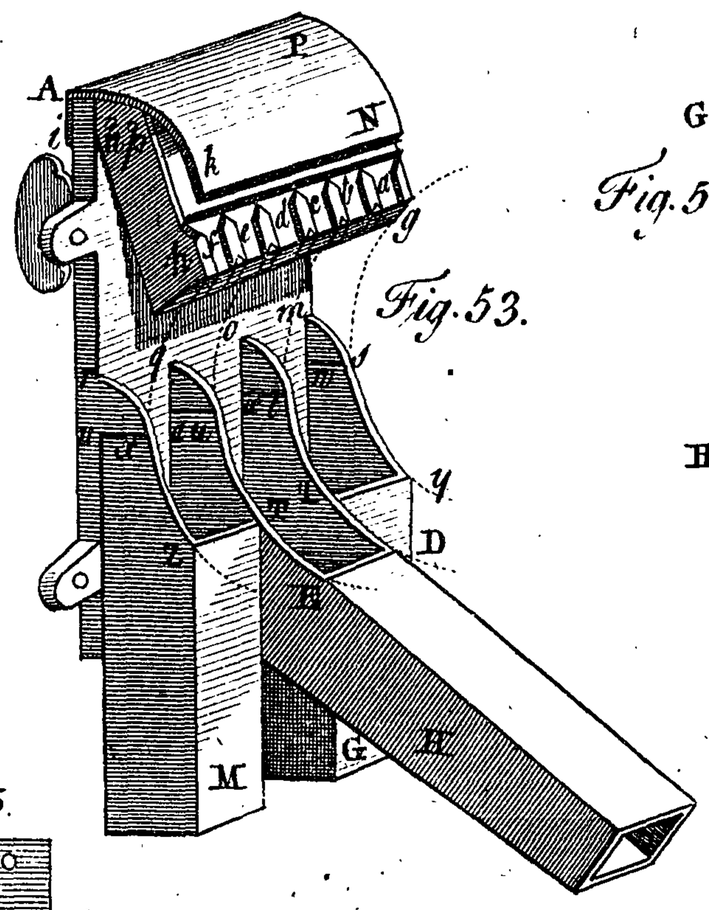


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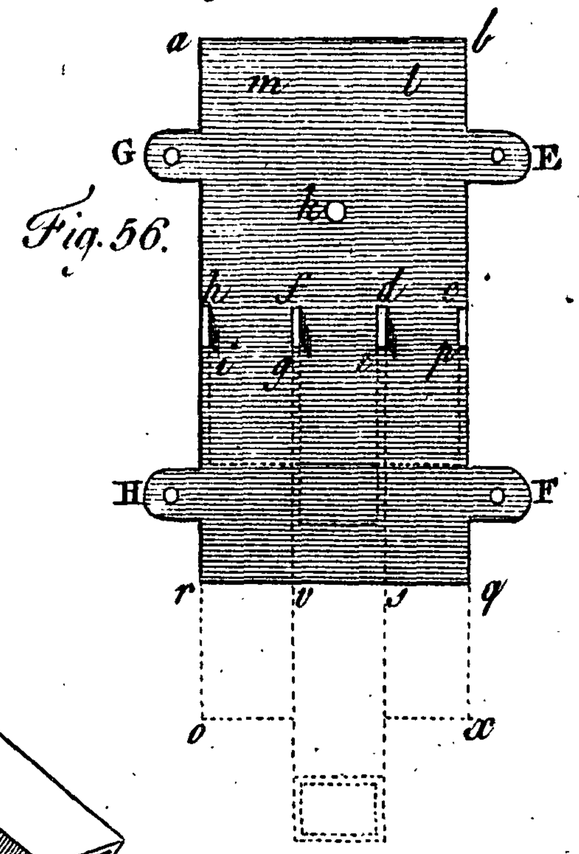


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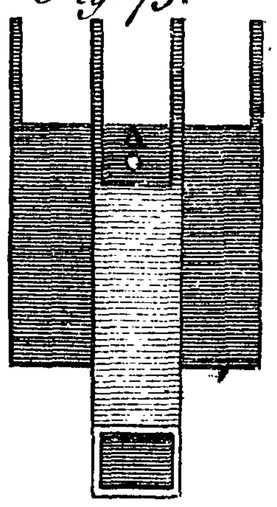


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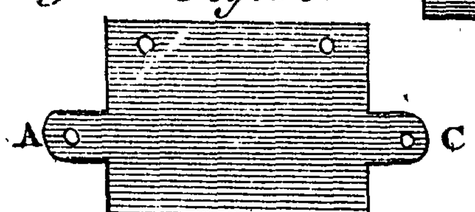


Fig. 55.



Fig. 68.

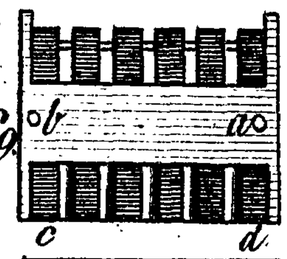


Fig. 69.



Fig. 71.

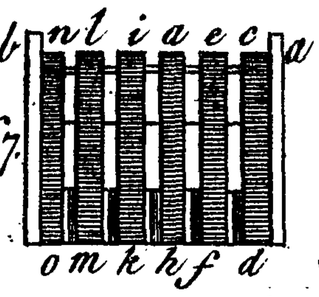


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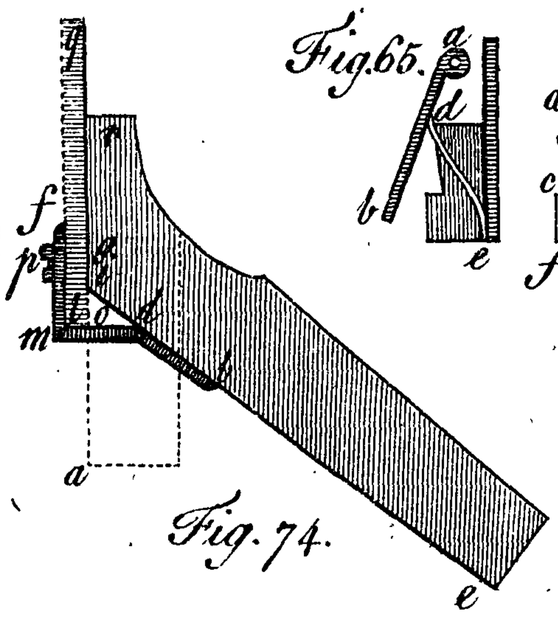


Fig. 74.

Fig. 65.



Fig. 66.



Fig. 63.

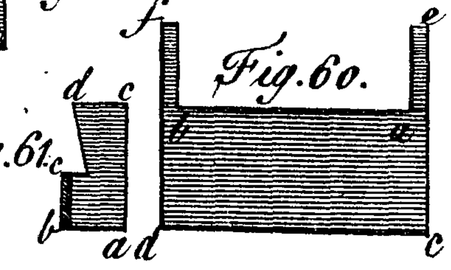


Fig. 60.

Fig. 61.



Fig. 70.

Fig. 57.

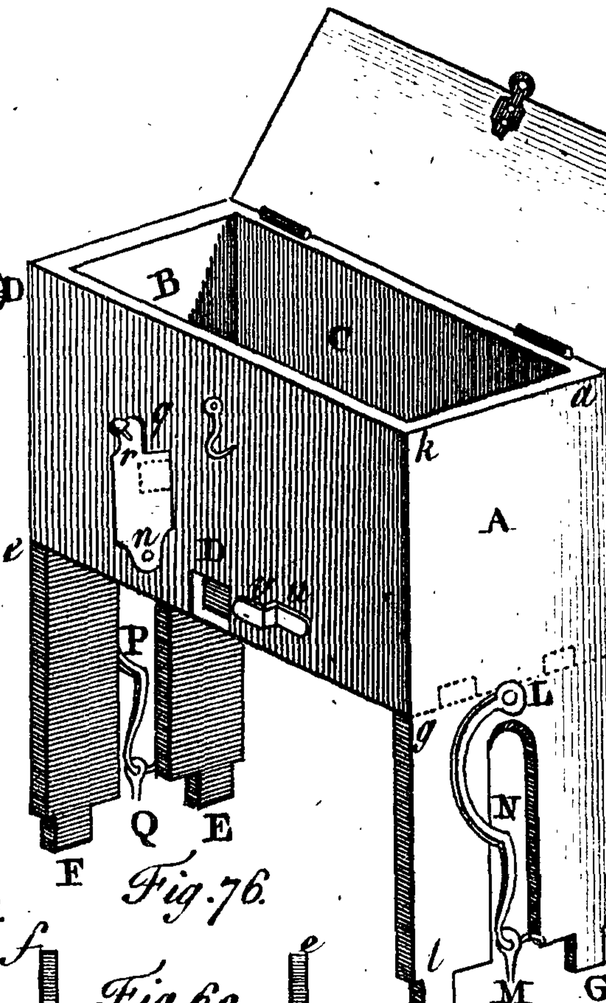


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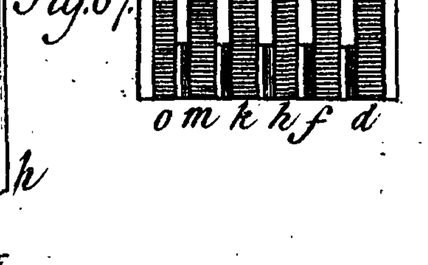


Fig. 58

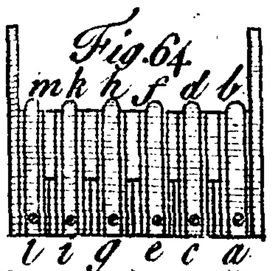
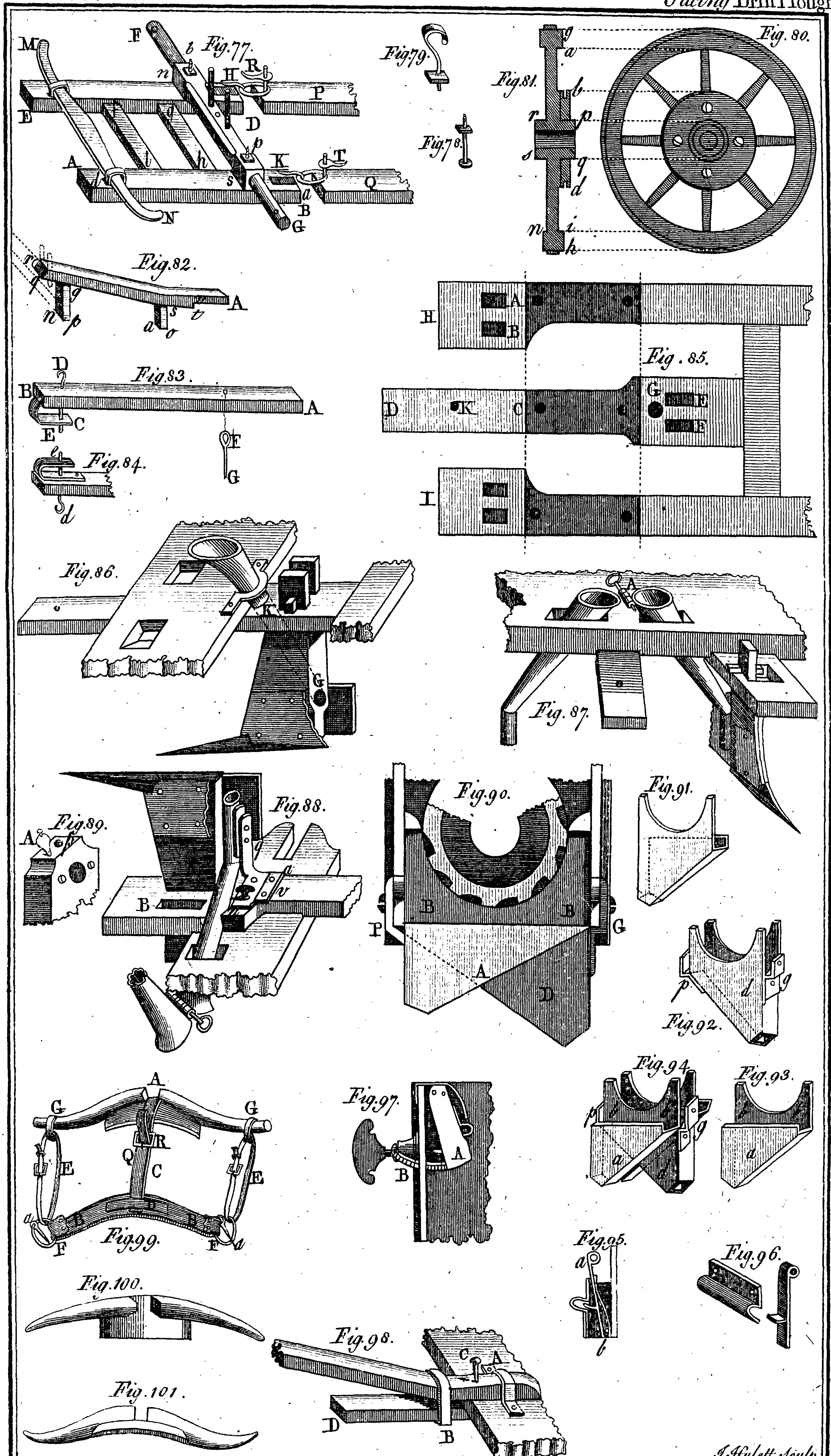


Fig. 64.

Scale for Fig. 50. 51. 54. 65. 56. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75 & 90.

J. Hulett Sculp.

PLATE. XIV. *Facing* Drill Plough.



O, the head of the plough into which the beams are mortiſed.

P, Q, R, the three beams.

S, a ſhoe of iron, (the whole part from S to A being of that metal) and into which the hoof of the plough is inſerted.

T, a ſhelf on which the mould riſes after it is cut up by the coulter and fore-part of the ſhare, till it is thrown out of the trench by the mould-boards.

V, V, the mould-boards, which throw the earth out on each ſide of the trench.

W, W, a band of iron, which faſtens the after-part of the plough to the main or middle beam.

X, the head of a tenon, which faſtens the mould-boards, and hoof of the plough to the main beam.

Z, Z, the two handles, like thoſe of a common plough.

a, *b*, a piece of board tenoned into the handles, in order to keep the handles in their proper poſition.

c, *d*, repreſents the ſurface of the ground when the plough is at work. Therefore all the parts below that dotted line are under the ground when the drain is cutting.

f, *e*, *g*, ſhews the angle which the coulters make with a line drawn parallel to the horizontal plane; and is nearly equal to forty-five degrees.

The figures are drawn on a ſcale of an inch to a foot; but many of the parts, being drawn in perſpective, cannot be meaſured.

We imagine it will be unneceſſary to ſay any thing farther with regard to the manner of working this plough, as the operation is the ſame as that with the common plough. But it may not be amiſs to obſerve, that the angle *f*, *e*, *g*, being greater than that by which the horſes draw upwards, the plough has too great a tendency to get into the earth; the conſequence of which is, that, when the ſoil is very ſtiff, and conſequently requires a very great force to draw the plough, the inſtrument cannot be held properly by the handles, the force of ſix men not being ſufficient to do this, but the plough will turn entirely over. This was ſufficiently apparent to the committee of the Society, at the firſt experiment, when the ploughs were tried in a ſtiff clay; for the tail of this very plough could not be kept down by ſix men at the handles. If therefore the angle *f*, *e*, *g*, were leſſened to about thirty-three degrees, this difficulty would, in a great meaſure, be removed. However, in marſhy, boggy, and moory ſoils, it will anſwer the intention extremely well, and make a clean trench of the dimenſions required by the Society; and therefore cannot fail of being a very valuable acquiſition in the practice of agriculture.

DRAPE, a farrow cow, or one whoſe milk is juſt dried up.

DRENCH, phyſic, &c. given to a brute by means of a horn cut properly for that purpoſe.

DRILL-PLOUGH, an inſtrument for ſowing corn in drills, or rows, which is an eſſential part of the New Huſbandry.

The two firſt inventions for ſowing in this manner were Mr. Worlidge's drill-plough, and Don Joſeph de Lucatello's ſembrador, both of which may claim the merit of inventions, and therefore muſt not be omitted in this work.

"Beſides the uſual method of ſowing corn, there are, ſays Mr. Worlidge, ſeveral other ways of diſperſing it, as by ſetting, and hoeing of it in, &c. This art of ſetting corn ſeems to be very ancient, as appears by Virgil, *Unguibus infodiunt et ipſis fruges.* And hath been a long time attempted to be brought into practice again, as appears by Mr. Platt' Adam's Tool revived. Mr. Worlidge then points out the defects in Mr. Platt's inſtruments, and proceeds thus:

"But to remedy and remove all manner of errors and incoveniencies that can be found in ſetting of corn, I ſhall here give you a plain and perfect deſcription of an eaſy and feaſible inſtrument that ſhall diſperſe your corn, grain, pulſe, of what kind ſoever, at what diſtance, and in what proportion you pleaſe to deſign, and that with very great expedition, and very little extraordinary charge, expence, or hazard.

"Firſt make a frame of timber, of about two or three inches ſquare, the breadth of the frame about two feet, the height about eighteen inches, the length about four feet, more or leſs as you pleaſe, as at *u u u u*, Fig. 1. Plate IX. Place this frame on two pair of ordinary wheels, like plow-wheels. The axle-tree of the two foremoſt wheels is to lock on either ſide, as doth the fore axle-tree of a waggon, for reaſons hereafter ſhewn. The hindermoſt axle-tree, being of iron, and ſquare in the middle, muſt be fixed to the center of the wheels, that the axis and wheels may move together: then, about the middle of the frame, in the bottom, let there be fixed an iron inſtrument, or of wood pointed with iron, like unto a coulter, made a little ſpreading at the bottom, in the nature of a ſhare, made to paſs through two mortiſes on the top, for its greater ſtrength; and made alſo to be wedged higher or lower, according as you will have your furrow in depth, as at *o o*; the uſe whereof is only to make the furrow: ſo that you muſt make the point thereof of breadth only to move the earth, and caſt it, and or force it, on either ſide, that the corn may fall to the bottom of the furrow. Then over this ſhare or coulter, a little behind it, may a wooden pipe be made, to come from the top of the frame to the lower end of the ſhare, tapering downward, as at *p*, and as near as you can to the ſhare: to deliver the corn immediately, as the ground is opened, and before any earth falls in; that what earth does afterwards fall in, may fall on the corn. This pipe is to proceed out of a large hopper fixed on the top of the frame, that may contain about a buſhel as at *q*: but ſo that the corn may gradually deſcend, according to the quantity you intend to beſtow on an acre. At the very neck of the hopper, underneath, in the ſquare hollow thereof, muſt be fitted in the edge of a wheel of wood, about half an inch thick, and proportioned to the cavity of the neck, as behind the letter *r*. The wheel need not be above two or three inches diameter, and fixed on an axis extending from one ſide of the frame to the other: on which axis is alſo to be another wheel with a groove on the circumference thereof, like the wheel of a ſpit or jack, as at *r*, which muſt anſwer to another wheel of the like nature and form, fixed on the axis of the hindermoſt of the wheels, as at *s*: then fit a line (of ſilk is beſt, becauſe it will not be ſo apt to ſhrink and reach as hemp) about theſe two wheels, that when the inſtrument moves on the hindermoſt wheels, by the means of the line, the ſmall wheel at the neck of the hopper may alſo move; which leſſer wheel in the neck of the hopper,

hopper, may have ſhort pieces of thick leather fixed in the circumference thereof, like unto the teeth of a jack-wheel, that upon its motion it may deduce the corn out of the hopper, in what proportion you pleaſe: for in caſe it comes too faſt, then you may by a wedge at the tenon of the piece whereupon the hopper reſts, as at *t*, or at the end of the axis of the leſſer wheel, force the wheel and hopper together; as, in caſe it ſeeds too ſlow, then may you remove them by the ſame wedges to a farther diſtance; alſo in caſe your line be too ſlack or too hard, you may prevent either extreme by a wedge in the place where the axis of the wheel moves; or by a third wheel, about the middle of the line, made to move farther or nearer, as you ſee cauſe.

"Alſo by means of the iron-rod *v v*, fixed to the foremoſt axis that is made to lock, may you guide your engine at pleaſure; which rod is made crooked at the end of the hopper, leſt that ſhould injure its motion.

"And at the turning, you may lift up your engine by the handles at *x*: for whilſt you lift it up, the corn feeds not until you ſet the ſame down again.

"One horſe and one man may work with this inſtrument, and ſow land as faſt or faſter than ſix horſes can plough; ſo that you may with eaſe compute the expence, in caſe your inſtrument be ſingle: but you may in the ſame frame have two ſhares at twelve inches diſtance, more or leſs, as you will have the rows of corn diſtant the one from the other; and two pipes out of the ſame hopper, and two ſmall wheels on the ſame axis, with other wheels anſwerable, every whit as eaſy to be performed as one; and then you may double your proportion of land in a day.

"This inſtrument will always keep the ſame proportion you firſt ſet it to, which you muſt thus contrive.—Firſt, know the length of the furrow you ſow: then caſt up how many of theſe furrows at ſuch diſtance your inſtrument is made for (whether a foot, more or leſs) will amount to an acre: then conclude how much to ſow on an acre; as ſuppoſe a buſhel: then divide that buſhel into ſo many parts as you have furrows or diſtances in that acre; then take one or two of thoſe parts, and put into your hopper, and obſerve whether it will hold out, or ſuperabound at the end of one or two furrows, and accordingly proceed and rectify the feeder: or you may judge by your own reaſon, whether it ſeeds too faſt or too ſlow.

"In caſe it ſeeds too faſt, notwithſtanding they be cloſe placed together, you may make that wheel at the loweſt axis, wherein the line moves, to be leſs than the upper; then will the motion be ſlower: and thus may you make it move as ſlow as you will, by augmenting the upper, and diminiſhing the lower wheels wherein the line is; and make it move faſter by the contrary rule.

"In caſe you drive apace, it ſeeds apace; in caſe you drive but ſlow, it ſeeds but ſlowly: here is no error.

"When you come to any turning at the land's end, by lifting up the hindermoſt part of the inſtrument, that thoſe wheels touch not the ground, the ſeeding of the corn immediately ceaſeth, until you ſet it down again.

"Alſo all the corn you ſow lies at a certain depth, none too deep, nor any too ſhallow.

"You may place a kind of harrow to follow; but the beſt way is to have on each ſide of each furrow a peice of wood, a little broad at the end, ſet aſlope to force the earth rounding on the corn. This may be well placed and fitted to the bottom of this inſtrument, juſt behind the ſhare and feeding pipe.

"By this method of ſowing any ſort of grain or pulſe, may be ſaved the one half, and in ſome places more, which by the other way is either buried ſo deep under the clods, that it cannot come up, or elſe it is ſo ſhallow, that the cold in the winter, or drought in the ſummer killeth it, or elſe lies on the ſurface as a prey to the fowls of the air: much alſo therefore falls in cluſters, twenty or thirty grains where one or two might ſuffice, which are common inconveniencies, and uſually happening to the vulgar way of ſowing corn: the greater half by far is loſt, which in all probability may be ſaved by the uſe of this very inſtrument, which will doubly requite the extraordinary charge and trouble thereof: for here is no corn ſowed under clods, but in rows, as the earth is ſtirred and moved: it is all at one certain depth and at one certain diſtance, and equally covered, below the injury of froſt, and heat, and rapine of birds. Alſo by this way corn may be ſown in the very middle or convenient depth of the mould, that it may have the ſtrength of the land, both below and above the roots whilſt in the other more uſual way, the corn falls to the bottom of the furrow on the gravel, clay, or ſuch like hard ground, where it ſeldom thrives ſo well as what happens to be in the midſt. This way alſo exceeds the way of ſetting corn, where the pins thruſt into the ground harden and faſten the mould, ſo that, unleſs the land be very light, it confines the roots to too narrow a place, which in this way is prevented; as I have obſerved in garden beans, that thoſe hoed in proved better than thoſe ſet with a ſtick.

"By the uſe of this inſtrument alſo may you cover your grain or pulſe with any rich compoſt you ſhall prepare for that purpoſe, either with pigeon-dung dry or granulated, or any other ſaline or lixivial ſubſtance, made diſperſable, which may drop after the corn, and prove an excellent improvement: for we find experimentally, that pigeon's-dung ſown by the hand on wheat or barley mightily advantageth it in the common way of huſbandry: much more then might we expect this way, where the dung, or ſuch like ſubſtance, is all in the ſame furrow with the corn; whereas in the other vulgar way, a great part thereof comes not near it.

"It may either be done by having another hopper on the ſame frame behind that for the corn, wherein the compoſt may be put, and made to drop ſucceſſively after the corn: or it may be ſown by another inſtrument to follow the former, which is the better way, and may both diſperſe the ſoil, and cover both ſoil and ſeed.

"The corn alſo thus ſown in ranges, you may with much more conveniency go between, and either weed it or hoe it, and earth it up as you think good, and at harveſt it will eaſily repay the charges.

"Alſo the fore-wheels being made to lock too and fro on either ſide, you may have an upright iron-pin fixed to the middle of the axis, extended to the top of the frame: and from thence a ſmall rod of iron to come to your hand, with a crooked neck juſt againſt the neck of the hopper; by means of which iron rod, you may lock or turn the wheels either way, and guide your inſtrument, and rectify it, if it deviate out of its right courſe.

"The hopper muſt be broad and ſhallow, that the ſeed

ſeed preſs not much harder when it is full, than when it is near empty, leſt it ſow not proportionably.

"Though this inſtrument may at firſt ſeem myſterious and intricate to the ignorant, yet I am confident it will anſwer to every particular of what I have written. Any ingenious wheelwright, joiner, or carpenter, may eaſily make it with very little inſtruction, and any ordinary ploughman may uſe it.

The chief inconvenience in this inſtrument ſeems to be, that the ſeed is liable to be bruiſed as it drops from the hopper, by the wheel in the neck of that hopper.

In the account which is given of the ſembrador, in the Philoſophical Tranſactions, it is juſtly obſerved, that the perfection of agriculture conſiſts in ſetting the plants at proper diſtances, in ground well looſened to a ſufficient depth, that their roots may be able to ſpread, in order to collect the nouriſhment which is neceſſary to produce and ripen their fruit. But this is ſo little obſerved, that almoſt all ſorts of ſeed are commonly ſown by handfuls at random; whence it happens, that corn is ſowed too thick in ſome places, too thin in others, and, frequently, the greater part of it is either not covered at all, or not deep enough; by which means it is not only expoſed to be eaten by birds, but alſo in cold countries to be ſpoiled by froſt, and in hot climates, by the ſun. To remedy theſe inconveniences, Don Joſeph de Lucatello invented an inſtrument, which, being faſtened to the tail of the plough, drops the ſeed regularly in the furrow, ſaves four parts in five of the quantity which is generally uſed, and becomes the means of procuring a conſiderable increaſe, without employing a perſon purpoſely to ſow.

As a few words will explain the mechaniſm of this inſtrument, which has its merit, though it has not been found to anſwer in common practice, we ſhall venture to give the following ſhort deſcription of it: becauſe ſome of the principles of this may poſſibly ſuggeſt an uſeful hint to an ingenious artiſt.

Fig. 2. Plate IX. is a box of wood: *a*, *b*, *c*, *d*, the cover of that part into which the corn is put, and which is open in Fig. 3. at W: *e*, *f*, *h*, *g*, *k*, *l*, Fig. 2. are the two ſides which cover that part of the box where the cylinder, which is ſtuck round with three rows of little ſpoons to through out the grains, is turned round. Theſe ſides are taken off in Fig. 3. to ſhew the cylinder R S, and the ſpoons *x*, *x*, *x*. The internal ſhape of theſe ſides is expreſſed in Fig. 4. where may be ſeen the four triangular pieces *p*, *p*, *p*, *p*, and the triangular interſtices *q*, *q*, *q*, which ſerve to convey the corn diſcharged by the ſpoons, to holes which let it out at the bottom of the box. T, is one of the wheels which turn the cylinder; and V the other end of the cylinder, on which the other wheel is to be fixed. The furrow in which the grain has been dropt is to be covered by the next turn of the plough; to which end the mould board muſt project conſiderably.

In uſing this inſtrument, according to Don Lucatello's method, it muſt be faſtened to the beam of the plough, at ſuch a height that the long projecting nails in the wheels may touch the ground ſufficiently to make them turn round, but not enough for the wheels to reſt upon it, and drag along without turning.

This way of turning the wheels, and conſequently the cylinder, muſt occaſion an unequal diſtribution of the ſeed, wherever the ground is rough and ſtony. For this reaſon, and on account of ſome other inconveniencies attending the uſe of it, the ſembrador is not an inſtrument to be recommended to farmers: but we would here refer to the conſideration of ſuch as are better ſkilled in theſe matters whether an inſtrument leſs liable to this objection, or to the fault which is found in Mr. Worlidge's drill, may not be formed, by placing the ſeed-box of the ſembrador in a frame like that of Mr. Worlidge, with (inſtead of the wheels of the ſembrador, which turn upon the ground) two wheels, grooved like pullies, fixed upon the axis of the cylinder, to be turned with cords, like the ſmall wheel at the neck of Mr. Worlidge's hopper. A ſquare frame, like that, will keep the box more ſteady, and therefore render the diſcharge of the ſeed more regular, than it can be in Don Lucatello's manner.

Huſbandmen have been long ſenſible, that ſowing corn by handfulls, or broad caſt, was a waſte of ſeed, and ſome attempts were made to conſtruct inſtruments for ſowing more regularly; but though the ſembrador and Mr. Worlidge's drill were ingenious inſtruments, it does not appear, that they or any other, anſwered in practice, till Mr. Tull contrived his drill-plough, which does perform very well. Mr. de Chateauvieux indeed ſays, he thought Mr. Tull's too complex, and invented another, which is very ingeniouſly conſtructed, but if we may judge from his deſcription it, it appears to be more complicated than Mr. Tull's, or any other; and being very expenſive, is not likely to be introduced into England. It is alſo too limited in its uſe, being conſtructed to drill only three rows, at one certain diſtance. Mr. Duhamel's drill, called a barrel drill, is more ſimple and cheaper, and may be more eaſily altered to ſow more rows, and at different diſtances, and will probably be offered to the public in a ſhort time, with theſe improvements.

Mr. Young in his Eſſay on the Culture of Coleſeed, complains much of the drill ploughs, on account of their being ſo weakly conſtructed. "I uſed," ſays he, "Mr. Randall's drill-plough, and in this charge (of expences of of the crops) do not include the repairs, which in all my trials have been ſo great, that it would be abſoutely unfair to inſert them; and yet it is not altogether the thing, to make no charge of this ſort, and eſpecially as I have ſeen no drill-plough (not excepting thoſe in the ſociety's room) but what would fall in pieces preſently, under the rough hands of ploughmen. Common ploughs are every where of a ſtrength proportioned to the hands they go through, and till a drill is diſcovered that will bear ſuch treatment, it is impoſſible to promote the new huſbandry: nor is it poſſible that any method ſhould be worth promoting while the inſtruments with which it is executed, remain in the predicament of all drill-ploughs at preſent."

There is indeed ſome ground for this complaint, but will be removed in a drill-plough now conſtructing.

M. Duhamel obſerves, that the drill-plough invented by M. de Chateauvieux delivers the grain with the greateſt exactneſs, and therefore deſerves much commendation; but that the price of it is too great for moſt farmers. His own, which we ſhall now deſcribe, has, for that reaſon, been the moſt generally uſed.

M. Duhamel's drill is faſtened to the fore-carriage of a common plough. The hind part conſiſts of a plank S S, Fig. 5. Plate IX. at leaſt three inches thick, which is called the table. Underneath this table, and to the bottom part of it, are ſtrongly fixed, as at T, T, T, three ſhares. The beam I, I, is faſtened to the fore-part of the table: and the handles L, L, are let into mortiſes in

the back part of the table, in which they are fixed. *a*, *a*, *a*, are three ſloped cavities cut in the table, to receive the ſeed from the cylinder, and convey it through a hole, about an inch in diameter, in the center of each of them, into the hollow *c*, at the back of the ſhare Fig. 6. The form of theſe cavities is more clearly expreſſed by *a*, *a*, *a*, Fig. 7. At *b*, *b*, *b*, *b*, Fig. 5. are fixed four ſtrong ſtandards, to hold the drill-box ſteady.

The ſhares Fig. 6, are made of wood and terminate at the bottom of their fore-part *a*, in a circular form, covered with iron. In their hind-part *b*, is a groove, through which the ſeed drops to the bottom of the furrow. The ſeed is conveyed from the cavities *a*, *a*, *a*, Fig. 7. to this groove *b*, Fig. 6. by means of a thin plate of iron *c*, rounded and fixed to the ſhare, at at *d*. Theſe ſhares are about an inch and a half thick, and their height from *a* to *b* is at leaſt a foot.

As theſe ſhares terminate in a curve at bottom, if they meet with any roots, dung not thoroughly rotted, or any other ſubſtance which they cannot eaſily divide, they force it down to the bottom of the furrow, and by that means are never liable to be choaked: and to prevent this ſtill more effectually, the middle ſhare is placed ſomewhat more backward than the two others. It is likewiſe made ſhorter, when uſed in land laid out in ridges, in proportion to the greater height of the middle of the ridges. The ſhares are generally ſeven inches aſunder.

The four ſtandards *b*, *b*, *b*, *b*, Fig. 5 and 7, are placed in ſuch a manner, that the blocks *n*, *n*, Fig. 8. in which a groove is cut, anſwer to the middle of this table. On an iron axle-tree which anſwers to the wheels, and which paſſes through the centre of the blocks, is fixed the cylinder, or barrel *o*, *o*, which is cloſed at its end, *p*, *s*, and is likewiſe divided by two partitions *q*, *r*. This barrel is made of thin ſplit deal, as are alſo the ends and partitions. *t*, *t*, is a thin board, or plate of tin or thin iron, faſtened with hinges, that it may be opened to put the ſeed into the three partitions *p q*, *q r*, *r s*. In the middle of each of theſe partitions, the barrel is pierced with holes three or four inches aſunder, and about a quarter of an inch in diameter. The barrel and the wheels are ſo fixed on the iron axle-tree, that they all turn together.

To know whether the holes *u*, *u*, *u*, in the three partitions of the barrel are of a proper ſize and number to diſtribute the ſeed in the manner that is deſired, let ſome, ſuppoſe half a buſhel, be put into each partition. The blocks *n*, *n*, being placed on each ſide, between the two ſtandards, whoſe inner ſides are rounded ſo as to fit the groove in the block, and the table *S*, *S*, being raiſed ſo that the wheels do not touch the ground, any one may eaſily ſee, by giving the wheels a turn or two round with the hand, whether the proper quantity of ſeed drops behind the ſhare; and alter it accordingly.

The barrel being properly fitted, the beam is faſtened to the fore-carriage of this drill. As it moves, the barrel turns with the hind wheels, and the ſeed drops out of the holes *u*, *u*, *u*, Fig. 8. into the cavities *a*, *a*, *a*, Fig. 7. and from thence into the hollow *c*, Fig. 6. in the hind-part of the ſhare.

When the plowman comes to the end of the field, he lifts up the hind carriage, which is light, and carries it till the horſes are turned for the next furrow.

M. Duhamel does not fix the diameter of the hind wheels, but leaves that to be determined by the length of the ſhares. His were ſo proportioned that where the ſhares touched the ground the wheels did not touch it by two inches. He obſerves, that this drill anſwered extremely well, where the ground was ploughed into an even or level furface: but that the wheels were too ſmall when the middle of the ridges was raiſed high; becauſe the ſhares were then on the higher part of the ridge, while the wheels were in the furrows.

In Fig. 7, are two thin boards *x*, *x*, ſomewhat bending, which riſe up to about half the height of the barrel. The uſe of theſe is to catch the ſeeds that may chance to drop from the oblique holes, and guide them into the cavities *a*, *a*, *a*.

It is well known, that when the fore-part of the ſhare terminates in a point, it pierces the deeper into the earth, the farther back the beam is placed on the fore-carriage: but as the bottom of theſe ſhares is round, they pierce neither more nor leſs when the beam is placed more forward. It is therefore adviſable to place the fore and hind carriage as near as poſſible to each other, becauſe the plough then goes eaſier, and the draught is lighter to the cattle.

The inſtrument is eaſily tranſported from place to place by means of two poles *y*, *z*, *z*, Fig. 7. The ends *y*, are placed on the fore carriage, together with the beam, and from thence paſs under the table, ſo as to raiſe the whole from the ground, on which the other ends *z*, *z*, reſt. The croſs bar *k*, *k*, ſecures thoſe ends, and keeps them at a proper diſtance.

M. Duhamel took the firſt hint of his ſeed box from an invention of Mr. Grenvile, a gentleman belonging to the king of France's ſtables. This was a hollow ball, fixed upon the axle-tree of two wheels, and pierced round the middle with a row of holes, through which the ſeed dropt as the wheels turned round. Upon a ſimilar principle, another gentleman, inſtead of ſowing under furrow in the common way, contrived a box to turn behind his plough; and that no more than the due quantity of ſeed ſhould be dropped, the lower half of the box moved upon a belt of leather, in the middle of which was fixed a piece of braſs pierced with a hole ſuited to the ſize of the ſeed intended to be ſown. By this means, the holes in the box could not drop any ſeed, but when they came oppoſite to the hole in the belt. A few grains were indeed ſometimes bruiſed in their paſſage; but, upon the whole, there was a geat ſaving of ſeed.

According to the above conſtruction of M. Duhamel's drill, the ſhares muſt always pierce to the ſame depth, becauſe the whole weight of the hind part of the drill reſts continually upon them: conſequently, it would be neceſſary to have ſhares of as many different lengths, as there are depths, at which each kind of ſeed ſhould be ſown.

We likewiſe apprehend, that when the ſhares have pierced to the depth intended, the weight of the drill may be made to reſt on the wheels, by preventing the axle-tree from riſing between the ſtandards, beyond ſuch a height as ſhall exactly regulate the depth to which the ſhares are to pierce. This may be effected, by bringing the ſtandards *b*, *b*, Fig. 7, nearer to each other; and placing between them, inſtead of the blocks *n*, *n*, Fig 8. two thick pieces of wood, made to ſlide up and down, with grooves, as in the blocks. Theſe pieces of wood may be fixed between the ſtandards, by means of two ſtrong iron pins run through the ſtandards into them: and to take off the friction of the axle-tree againſt theſe pieces of wood, may

may be made to turn on two friction wheels, placed in the lower part of them; or rather on four or six ſmall iron rollers turning on their axis in a box inſerted in each of theſe pieces, which may be raiſed or lowered, by means of a row of holes in the ſtandards, through which the iron pins are put, ſo as to give the axle-tree room to riſe to the height that ſhall be thought neceſſary to make the ſhares pierce to the intended depth, before the weight of the drill ſhall reſt upon the axle-tree.

That the axle-tree, moving on ſuch roller, will have leſs friction, or require leſs ſtrength to make the wheels turn round, even when the weight of the whole inſtrument lies upon it, than it has in the blocks, with only the weight of the grain, is evident from the following fact. The gentleman who firſt thought of this invention applied to it a roller of four tons weight, which is now drawn with eaſe by two ordinary horſes, even acroſs his ploughed grounds.

It appears from this eaſy motion of the roller, that there can be no danger of the axle-trees turning, though loaded with the weight of the whole inſtrument. Other conſiderable advantages will alſo ariſe from the drill's reſting thus upon the wheels; for the labour of the ploughman will be greatly leſſened, the inſtrument will move ſteadier and more uniformly, and the draught will be much eaſier for the horſes.

Deſcription of M. de Chateauvieux's DRILL-PLOUGH, *and of its manner of working. Written by himſelf.*

"When I firſt ſet about conſtructing this drill-plough, my deſign was to make an inſtrument which ſhould diſtribute the grains of corn one by one, at the diſtance of ſix inches from each other. I attained this preciſion; but ſoon perceived that it was not the only thing requiſite, or even ſo neceſſary as I had imagined.

"I could, indeed, make my drill diſtribute ſome grains more than it did in its firſt ſtate: but I plainly found that the quantity of ſeed would not yet be ſufficient to produce a proper number of plants; eſpecially as it muſt not be expected that every ſeed will grow; 1, becauſe, whatever care be taken in chuſing the ſeeds, there will always be among them many which will not ſprout at all; 2, becauſe a great number of them will be deſtroyed by inſects, either before they vegetate, or ſoon after they ſpring up; and 3, becauſe the winter's cold will frequently deſtroy ſeveral of the young plants, and greatly weaken others. Experience taught me, that, to guard againſt the effect of theſe caſualties, it was neceſſary to ſow more ſeed than I did at firſt.

"To this end, and that I might be enabled to increaſe the quantity to whatever degree ſhould be found moſt proper, I enlarged the cavities of my cylinder, ſo that I can now ſow either more or leſs ſeed, with equal eaſe, by means which ſhall be explained in the deſcription of this inſtrument.

"Each of theſe cavities, in the cylinder of my firſt drill-plough, could contain but one grain of corn; but in the preſent, they are large enough to hold three or four, which, though they touch one another there, are ſo ſeparated when they fall from thence, and in their paſſage through the pipes, that they drop at diſtances from each other in the furrow; for they are not all turned out of the cavities in the cylinder at the ſame time: beſides which, I have obſerved, that the ground upon which they fall is always more or leſs uneven, and that this circumſtance conſequently contributes effectually to ſeparate them.

"I confeſs that the deſcription which I am going to give is very long, and that this, together with the ſight of ſo many figures as are here repreſented, may, at firſt, make people think that my drill is a very complicated machine, and that this complication muſt render it very defective: but I beg of them not to give way to this prejudice, and to ſuſpend their judgment till they have ſtudied the inſtrument thoroughly; after which, I hope they will be ſenſible that all its mechaniſm is employed only to procure the movement of the axis, and the play of the valves. I even flatter myſelf that it will be deemed a ſimple inſtrument, by thoſe who rightly conſider how few of its parts are moved; a circumſtance which prevents its being put out of order in working. The great quantities of land which were ſowed in the autumn, with perfect ſucceſs, ought to remove the diffidence of thoſe who may ſtill incline to doubt whether this drill will always and regularly perform equally well.

"It will perhaps be objected, that the expence of making this drill plough is too great, and that numbers of farmers, who have not much land, may not be able conveniently to purchaſe it.

"It is very true that if this inſtrument could be conſtructed for a ſmall price, the benefits reſulting from it would be the more extenſive: but it muſt alſo be allowed that this objection does not hold good with reſpect to all farmers, or to gentlemen who keep ground in their own hands. Theſe will ſoon be repaid the expence of ſuch a drill, by the ſaving of ſeed; and as to the poorer ſort, who have, for example, but ten or twelve acres of arable land, the expence will be but trifling, if four or five neighbours, in that caſe, join to purchaſe ſuch a drill, which will be more than ſufficient to ſow all their ground. Or, each pariſh may come to an agreement, that he who can afford to buy ſuch a drill, may let it out for ſo much an acre; a method which would be advantageous to all; but particularly to thoſe who, by uſing it, would ſow their land with very little charge.

"But I think, and hope, that when the great advantage of uſing this inſtrument is known, no huſbandman will be without it merely becauſe of the price; as this conſideration can never out-weigh the benefits which will accrue from it in all reſpects, by leſſening the expence of every article in the operation of ſowing, and by the farther emoluments which will be reaped at harveſt.

"I therefore, in conſtructing this inſtrument, paid leſs regard to the price which it might coſt, than to the means of rendering it very ſolid, by a firm aſſemblage of all its parts; which was eſſential, in order to prevent the frequent accidents it would otherwiſe have been expoſed to, in the hands of ignorant peaſants, who have no idea of handling things gently, and are ſtill leſs capable of repairing any miſchief done to a very nice machine.

"At the ſame time that I ſtudied ſtrength and ſolidity in the conſtruction of this inſtrument, it was not leſs neceſſary to take particular care that it ſhould execute well and regularly the purpoſes for which it is intended, both with reſpect to the manner of its diſtributing each grain, and to the movement of the axis, which is always in motion from the moment the horſe ſtirs, ſo that the ſeed runs inceſſantly.

In deſcribing this inſtrument, I have firſt given a general idea of its make and manner of working, that the reader may be thereby enabled the more eaſily to underſtand the ſubſequent minute deſcription of all its parts, with their relation to, and connection with, each other. The method of uſing it will then follow.

General Idea of M. de Chateauvieux's DRILL-PLOUGH, *Plate* X.

A (Fig. 1.) is a wooden-box, or hopper, whoſe bottom is at the height of the line F G. This hopper has four feet, two of which are ſeen at *k* and *l*. Theſe four feet, which may be called tenons, are fitted into four mortiſes in the table H L. The bottom F G of this hopper reſts immediately upon the ſeed-box B, which is made of thin plates of braſs, and is placed between the bottom of that upper box or hopper, its two ſides which have the four feet, and the table H L. B is the front of this ſeed-box. The corn drops through a hole in the middle of the bottom of the hopper A, into the ſeed-box B. This ſeed-box B contains a braſs cylinder, which traverſes it, and is pierced by and fixed to an iron axis M P, at the two ends of which are firmly faſtened two pullies Q and P. The two pivots of the axis are ſupported by two ſtandards, one of which is ſeen at M H, and a part of the foot of the other at L. Theſe two ſtandards are fixed to the two ends of the table by two keys, like thoſe of a turner's lathe.

The table upon which all theſe pieces reſt, is itſelf, at its two ends, ſupported by, and faſtened to the two beams T V, R S. Theſe two beams are fixed in parallel lines, by a traverſe X Z. In the middle, U, of this traverſe, is pinned the end of another piece of wood, which paſſes from thence under the table, in a parallel direction with the two beams, and upon which alſo this table is faſtened by two ſcrews.

This inſtrument has three exactly ſimilar ſhares, D K, *e*. Two of theſe ſhares, K and D, are faſtened to the two beams, at I and *p*, by a tenon and a peg, aud the third is faſtened in the ſame manner, towards U, to the piece which runs parallel to the beams. Each of theſe ſhares is covered at the bottom with a plate of iron, N, E, C, and the point of one of them, ſuppoſed to be in the earth, is ſeen at Y.

The harrow is compoſed of three pieces of wood *q* O, O W, W *n*, jointed together by mortiſes and tenons at O and W, and of two ſimilar iron teeth W *z*, O R. Theſe two teeth are faſtened to the harrows by the ſcrews W and O, and the harrow is faſtened to the traverſe X Z by two hinges near *q* and *n*. Upon the two beams are faſtened by two ſcrews, at *m* and *e*, two ſquare ſprings *m i q* and *e* Z *n*, of which the two ends, *q* and *n*, preſs upon the harrow to make its two teeth enter into the earth.

The fore-carriage is compoſed of two ſimilar and parallel pieces, V *r*, S *s*, upon which is faſtened the ſpring-tree bar *r s*, and the axle-tree *u t* of the two wheels. The drill (of which the manner of working will be explained hereafter) reſts upon this fore-carriage, whenever there is occaſion for its ſo doing, by means of a wooden bar *d x*, one of the ends of which, towards *a*, paſſes thro' two belts which are faſtened to the table, and of which only one is ſeen here. The other end *x* of this bar, reſts upon the middle of the axle-tree of the fore-carriage, between two pins driven into the upper part of that axle-tree. The fore-carriage is likewiſe faſtened to the drill by hooks and rings, as at *v* and S.

At *t* and *u* are two pullies, which are faſtened to the ſpokes of the wheels by three or four ſcrews. The pullies Q and *u* are encircled by a thong of leather, of the ſame breadth as the grooves of the pullies, and of which the two ends are buckled together, like a garter. The two other pullies P and *t* are encircled in the ſame manner by another ſimilar thong.

Manner in which the DRILL *works, Plate* X.

The ſeed being put into the hopper A (Fig. 1.) the whole machine being drawn by the horſe harneſſed to the ſpring-tree bar *r s*, and guided by the ſeedſman, who holds the two handles; then the three ſhares, D K *e* C, open each of them a furrow, and at the ſame time the pullies, *u t*, by their turning, turn, by means of the thongs, the two other pullies, Q P, and conſequently likewiſe the cylinder, which is in the box B, and which, in turning, diſtributes the ſeeds equally into three pipes which come out at the bottom of the ſeed-box. This diſtribution of the ſeed is performed by a mechaniſm which cannot be repreſented here, but will be particularly explained hereafter. The ends of theſe pipes are ſeen here at *a* and *b*. Theſe pipes *a* and *b* drop the ſeeds into two other pipes *d* and *f*. The pipe *a* tranſmits its contents into the pipe *d*, which terminates behind the ſhare D, at *h*, where it depoſits the ſeeds in the furrow made by this ſhare. In the ſame manner, the end of the pipe *b* of the box conveys the ſeed which paſſes through it into the pipe *f*, which terminates at *g*, behind the ſhare K. And likewiſe in the ſame manner, the third pipe of the box, which cannot be ſeen in this figure, empties its contents into a third pipe, of which part is ſeen here at *v*, *y*, and which terminates behind the third ſhare *e*, C. The two teeth of the harrow, paſſing afterward each of them between two of theſe furrows, cover the ſeeds which have dropped into the three furrows.

According as ſcrew B, in the fore-part of the box is turned more or leſs from the right to the left, or from the left to the right, a greater or leſs quantity of ſeed drops into each furrow, by means which will be explained hereafter. But ſo long as this ſcrew remains in the ſame ſituation, the quantity of the ſeed that is dropped will be conſtantly the ſame.

To render the deſcription of this firſt figure the more diſtinct and intelligible, ſome things are paſſed over here which will be ſpoken of hereafter, and among others two traverſes which faſten together the two pieces V *r*, S *s*, of the fore-carriage. Alſo the box B is here made larger than it ſhould be according to the deſcription which will be given of it, in order that the pipes *a* and *b*, *d* and *f* might appear the more diſtinctly. For the ſame reaſon alſo the out-lets of the pipes *a* and *b* are not here repreſented as let into the mouths *d* and *f* of the two other pipes, as they ſhould be in fact.

In the following deſcriptions, that part of a piece which immediately faces the horſe, is always called the fore-part of the piece, excepting only the piece named the bin, and its valves, in ſpeaking of which the contrary rule is obſerved. But, every where, the right or the left ſide of a piece, is to be underſtood as of the ſame ſide of the horſe.

When

When a machine is to be made from drawings, thoſe drawings, eſpecially when ſmall, cannot, by their ſcale, point out preciſely the exact dimenſions of every nice, and oftentimes very important, piece, ſo as to enable a workman to conſtruct it perfectly. To remedy this defect, all the meaſures of every piece, and their connection with each other, are here particularly ſpecified in the written deſcription, which is to be looked upon as a ſurer guide than the meaſures reſulting from the engraved figures: and to render this ſtill more certain, the weight of the niceſt pieces is alſo given.

Deſcription of the two Beams which ſupport the Table and the Hopper, Plate X.

The two beams T V, R S, (Fig. 1.) are repreſented as if ſeen from above at *a*, *b*, *d*, *e*, (Fig. 2.) They are exactly ſimilar. Each of them is three feet five inches and a half long, two inches and five-ſixths wide (for example from *b* to *c*), and one inch five-ſixths thick. All their ſides are at right angles to each other.

Theſe two beams are joined by a traverſe *f h* (Fig. 2.) and X Z (Fig. 1.) This traverſe is two inches and five-ſixths wide, meaſuring it horizontally, one inch and three-twelfths thick, and one foot and a half long, excluſive of two tenons, one at each end, by which it is mortiſed into the two beams, which are parallel to each other. The upper ſurface of theſe beams, and that of their traverſe, are exactly even. The diſtance from *c* to *f* (Fig. 2. Plate XI.) is one foot eleven inches and a quarter; and the ſame from *i* to *h*.

Underneath each beam, and at the diſtance of five inches from the extremity *a* (Fig. 3.) an iron-pin, ſeven-twelfths, or two thirds of an inch in diameter, projects to the length of four inches and one-third. One of theſe pins is ſeen at Δ (Fig. 1.) Its other end is driven faſt into the middle of the breadth of the under ſurface of the beam, from which it projects perpendicularly. Theſe two pins are to enter into two holes in the axle-tree of the hind-carriage, which will be ſpoken of hereafter.

Of the two Handles, Plate X.

Two handles, *k n*, *l m* (Fig. 2.) are faſtened to the two beams, each of them by a tenon *d*, (Fig. 3. Plate XI.) five-ſixths of an inch thick, which paſſes through the beam, and is ſecured underneath it by a wooden pin or peg *d*, about half an inch in diameter. Each handle is likewiſe ſupported upon the beam by a wooden prop *p l*, which is ſeen at R and T (Fig. 1.) Each of theſe props is three quarters of an inch in diameter, and is driven very tightly into the handle and the beam, at *p* and *l* (Fig. 3, Plate XI.) ſo as to paſs quite through them. The upper end *c* of thoſe props is ſeen at V and X, in Fig. 2. From the extremity *k* of the handle (Fig. 2, and 3,) to the extremity *a* of the beam is one foot, and one-third of an inch, and the diſtance is the ſame from *d* to *l*, in Fig. 2. The breadth and thickneſs of the lower end of the handles at *g k* (Fig. 2, Plate X. and 3, Plate XI.) is nearly the ſame as the breadth of the beams, upon which they reſt: but they leſſen by degrees from *k* to *n*, and are rounded off, in ſuch manner that the diameter of their upper end *n* is but one inch and a third.

With reſpect to their poſition, they form, with the beams, an angle of 40 degrees, as at *c k a* (Fig. 3, Plate XI.) The handle is nearly ſtrait from *k*, to about a third part of its length, and from thence it bends more and more downward to its end *n*, which is perpendicularly two feet higher than the upper ſurface *k m* of the beam. This height is expreſſed by the pricked line *n m*. The ſpace between the handles likewiſe increaſes with their length, ſo that, at their ſmalleſt ends, the diſtance from the outſide *m* of the one, to the outſide *n* of the other (Fig. 2, Plate X.) is one foot eight inches and a half, and each of them is equally diſtant from the middle line *o p*.

Theſe two handles are faſtened to each other by a traverſe *q r*, which is repreſented in Fig. 1, but is expreſſed here only by two pricked lines, in order to ſhew a piece which is under it, and which will ſoon be ſpoken of. This traverſe is one inch and five ſixths broad, and two-thirds of an inch thick. Its ends, being tenons, are let into mortiſes in the beams, and faſtened there by wooden-pins, at *q* and *r*. One of theſe ends appears at *q* (Fig. 3. Plate XI.) From the middle of the length of this traverſe hangs an iron-hook, as in Fig. 1, Plate X. This hook is about a quarter of an inch thick, and five inches and a half long, from its extremity *e* (Fig. 3, Plate XI.) to its other end, which is faſtened to the traverſe. The lower end of this hook is put through a ſmall ring faſtened to the harrow between the ſcrews of the two teeth, and ſerves to hold up the harrow when the drill is placed upon its hind carriage, in order to be removed, as will be ſaid hereafter. The traverſe is fixed in the handles at the diſtance of thirteen inches from their extremity *k* (Fig. 2, Plate X. and 3, Plate XI.) The two handles, which the ſeedſman holds in his hands by their ends *m n*, ſerve to direct the drill.

Of the Harrow, Plate X.

The harrow is compoſed of three pieces of wood *s t*, *y x*, *t x*, (Fig. 2.) and of two teeth faſtened to this laſt. The three pieces are repreſented at *q* O, O W, and W *n*, and the two teeth at W *z* and O R, in Fig. 1. The two pieces *s t*, *y x*, (Fig. 2.) are each of them faſtened to the traverſe *s y*, by an iron-hinge, in ſuch manner that the upper ſurface of the ends *s* and *y* of theſe two pieces is exactly level with the upper ſurface of the traverſe *s y*. Their two other ends, *t* and *x*, are terminated by a tenon which is pinned into the ends of the traverſe *t x*. The upper ſurface of theſe three pieces *s t*, *y x*, *t x*, is perfectly even.

The two pieces *s t*, *y x*, are each of them one foot eight inches long, from the end *s*, to the traverſe at *t*. They are two inches and one-third broad, meaſuring over their upper ſurface, and one inch and two-thirds thick. The fore-end of theſe pieces towards the hinge makes an angle of about ſixty-five degrees, with the upper ſurface, as is repreſented in the profile (Fig. 4.) where the lines *d a*, *a b*, expreſs this angle. This ſlope is made, in order that the harrow may the more eaſily preſs upon the ground, by moving on its hinges; and for the ſame reaſon all friction between the ſides of the harrow and thoſe of the beams is avoided, by leaving an interval of about one-ſixth, or one quarter of an inch between them. The lines, or edges *t s*, *x y*, (Fig. 2.) are parallel, and the diſtance between them is one foot

and

and five-ſixths of an inch. The traverſe *t x* is two inches and nineteen twenty-fourths wide, and one inch and two thirds thick.

In the middle of the breadth of the upper ſurface of this traverſe, and cut perpendicularly to that ſurface, are two ſquare holes, M and N, diſtant from each other ſeven inches and a half, from the center of one to the center of the other, and both equally diſtant from the middle line *o p*.

Of the Teeth of the Harrow, Plate X.

In theſe two holes M N in the traverſe of the harrow are faſtened, as will ſoon be ſeen, two iron-teeth, perfectly alike, ſo that it will be ſufficient to deſcribe one of them. This tooth is ſhaped almoſt like the head of a lance, if we ſuppoſe its two ſides to be bent towards each other, ſo as to form a kind of groove or channel. Theſe two ſides, or fins, are ſeen in perſpective, ſideways in Fig. 5, behind in Fig. 6, from above, and from before, in Fig. 7.

The ſhank *b d* (Fig. 5.) is five inches and an half long, from its riſe at *a b*, to its end *d*; and three quarters of an inch thick at *a b*, where it is made ſquare. This thickneſs is increaſed a little at *c*, in order to form the ſhoulder repreſented at *a b* (Fig. 7.) The diſtance from *a b* (Fig. 5.) to this ſhoulder *c*, is three inches. The ſquare thickneſs of the ſhank, from *c* to *n*, is half an inch; which is likewiſe the ſize of the holes M N (Fig. 2.) The reſt of the ſhank is round, and half an inch in diameter. Its upper end is a ſcrew, fitted to receive a nut about half an inch thick, and a little more than an inch ſquare. The point *e* does not vary from the direction of the ſhank, either to the right or the left, as appears by Fig. 6: but the ſide *b e* (Fig. 5.) bends a little forward, ſo that the point *e* advances one inch and a quarter beyond the pricked perpendicular *n b f*. The upper and outer extremities *c* and *f* of the fins (Fig. 7.) are two inches and one-twelfth diſtant from each other, and equally diſtant from the middle of the ſhank. The width of each fin, in this part, from *s* to *f*, or from *s* to *c*, is one inch and a half. From thence they leſſen by degrees down to their point. The edges of theſe ſides, or fins, are almoſt ſharp, but their thickneſs and ſtrength increaſe towards their back.

The two teeth of the harrow are placed exactly in the middle of two parallel lines ſuppoſed to be drawn from the point of the ſhares, by which means theſe teeth will enter into the ground at equal diſtances from the ſmall furrows made by the ſhares, into which they will throw back the quantity of earth neceſſary to cover the ſeeds perfectly.

As to the poſition of theſe two teeth, they are faſtened in the two holes M and N of the traverſe *t x* (Fig. 2.) as is repreſented by the perſpective view of them in Fig. 8. The ſhank of each tooth is run through the holes in the traverſe *x t*; its ſhoulder is truſt up cloſe to the under ſurface of this traverſe; and a nut, under which is placed a very thin plate of iron, fixes at the top. The back and point of theſe two pieces ſhould face exactly the fore-part of the drill.

Hinges of the Harrow, Plate X.

To return to the hinges *s* and *y* (Fig. 2.) which are exactly alike, and which are ſeen at *q* and *n* in Fig. 1. Their breadth is one inch and two-thirds, during their whole length, from *v* to *f* (Fig. 2.) The joint *s*, of this hinge, is half an inch in diameter. The claw, from the joint *s* to *f*, is two inches and a quarter long, and is faſtened to the traverſe *f b* by a thumb-ſcrew repreſented in perſpective in Fig. 9, and which ſcrews into a nut *a b*, which is faſtened to the bottom of the traverſe, by two nails. This ſcrew (Fig. 9.) is one-third of an inch in diameter. It is ſcrewed down by means of a correſponding ſcrew in the nut under the traverſe, till its ſhoulder *c n*, which is two-thirds of an inch in diameter, preſſes upon the claw of the hinge: for which ſee alſo Fig. 4. The length of the other claw of the hinge *s v* (Fig. 2.) from the joint *s* to its end *v*, is four inches and a half. The thickneſs of each claw towards the joint, is a quarter of an inch, and from thence that thickneſs leſſens by degrees to the end *v*. The claw *s v* is faſtened to the piece *s t* by two flat-headed ſcrews.

Spring of the Harrow, Plate X.

Upon this claw, and between theſe two ſcrews, preſſes the end B of a ſpring A *z* (Fig. 2.) which forms an angle at A, and is faſtened to the beam *a b*, between D and *z*, by two flat-headed ſcrews, of which the laſt D is two inches and an half diſtant from the end *z* of the ſpring. Theſe two ſprings are ſeen at *m i e Z n* in Fig. 1. The length of this ſpring from *z* to A (Fig. 2.) is thirteen inches and an half, and from the angle A to B two inches and a quarter. Its breadth at *z* is one inch and an half; at N it is one inch and one-twelfth; and at B it is thirteen twenty-fourths of an inch. Its thickneſs at *z* is five twenty-fourths of an inch, and from thence that thickneſs diminiſhes to A, where it is but one-ſixth of an inch. The part A B increaſes in thickneſs from A to B, where it has a head, which alone preſſes upon the claw of the hinge between the two flat-headed ſcrews. This part of the ſpring, with its head, is repreſented plainly, in perſpective, in Fig. 10. When this ſpring is in its ſtate of reſt, the whole of its under ſurface from N to *z* (Fig. 2.) lies exactly flat upon the upper ſurface of the beam. The end *z* of this ſpring is fifteen inches from the end *b* of the beam to *b*. Theſe ſprings ſhould be made of good well hammered ſtuff, prepared like that which is uſed for the ſprings of coaches; by which means they will have a body, and not be ſubject to break or bend. If they appear to be too weak, they may be placed a little farther from the joint of the hinge, in which caſe they will the better preſs the teeth of the harrow down into the ground.

Connection of the Beams, with the Table and Shares, Plate X.

The thickneſs of a quarter of an inch is taken off from the upper ſurface of each of the two beams, from *z* (Fig. 2.) immediately adjoining to the end of the ſpring, to Q, in the one; and from E to F in the other; being, in length, eight inches and two thirds. In theſe lower ſpaces is placed the table, which will ſoon be ſpoken of, and of which the extent is here indicated by pricked lines. This table is ſeen at H and L, in Fig. 1. It is faſtened to the beams, by four ſtrong flat-headed ſcrews, at *z*, I, G, and H (Fig. 2.) and is ſeen

ſeen in profile in Fig. 3, Plate II. at *i* and *r*. This table reſts likewiſe upon a piece K L (Fig. 2.) of which the end K, being a tenon, is pinned into the middle of the length of the traverſe *f h*; as is alſo ſeen at U (Fig. 1.) This piece K L (Fig. 2.) is two inches and five ſixths broad, meaſuring it horizontally, and one inch and five ſixths thick. Its length is ſuch, that its end L reaches, at moſt, no farther than the edge Q F of the table. At the end of this piece appears a ring, which is faſtened under it, and of which the diſcription and uſe will be ſeen hereafter. The upper ſurface of this piece K L, from K to Y, is level with the upper ſurface of the two beams, and the traverſe *f h*: but from Y to its end, a quarter of an inch is taken off from its thickneſs, in the ſame manner as from the oppoſite parts of the two beams, to fit it for the reception of the under ſurface of the table. A ſide view of this is given in Fig. 11. where *a b* is the profile of this ſurface, which, from *a* to *b*, is level with the ſurface *d a* of the traverſe, and from *b*, to its end *c*, is a quarter of an inch lower, that the table may reſt upon it.

In the middle of the breadth of the upper ſurface of this piece K L (Fig. 2.) and perpendicular to that ſurface, a mortiſe P is cut quite through it, to receive the tenon which is ſeen at U, Fig. 1. This mortiſe is throughout two inches long, and one inch wide. Its end P (Fig. 2.) is three inches and eleven twelfths diſtant from the traverſe *f h*. Theſe two beams are pierced in the ſame manner by two ſimilar mortiſes Q and R, of which the ends Q and R are one inch and eleven twelfths diſtant from the ſide S T of the table. The tenons which paſs through theſe two mortiſes are ſeen at I and *p* in Fig. 1. Theſe three mortiſes are to receive the tenons of three exactly ſimilar ſhares, of which the following is the deſcription. Theſe three ſhares are ſeen at D, K, and *e* in Fig. 1.

Of the Shares, Plate XI.

The ſhares are cut out of a plank, and Fig. 12. repreſents one of their two ſurfaces. The lines which limit this ſurface are perpendicular to each other, excepting *i d*; the line *d c* is ſix inches long; *c f*, nine inches; *f g*, two inches and a quarter; *g l*, five inches and an half; *l m*, two inches; and *h i*, half an inch. This plank is every where an inch thick, except at the edge *e d*, where it forms an acute angle, as at *b*, Fig. 13. which repreſents the bottom of the plank *c d* (Fig. 12.) The part *g l*, in which is the hole *k*, is the tenon which enters into the mortiſes P, Q, R, (Fig. 2.) before deſcribed. Fig. 14. repreſents the top of this plank, and of its tenon.

Fig. 15, is a perſpective view of an iron ſhare which is fixed under the plank, as in Fig. 17. Its point (Fig. 15.) extends from *e h* to *f*. Its ſole, which extends from *c h* to *a c*, and the ears *a b*, *c d*, are all of one piece. Fig. 16. repreſents a geometrical plan of this ſhare, in which *d f*, and *g h*, are the places from whence the two ears ariſe.

The length of the point from *e h* to *f* (Fig. 15.) and from *a b* to *c* (Fig. 16.) is four inches. Its height towards *h*, or towards *e* (Fig. 15.) is about one inch and a quarter, and from thence it leſſens gradually to *f*, which is the point. Its breadth *a b* (Fig. 16.) is the ſame as the thickneſs *c o* (Fig. 13.) of the plank of the ſhare, and it leſſens gradually from thence to its point *c* (Fig. 16.) A notch is made in the upper part of this point, between *e* and *h* (Fig. 15.) or between *a* and *b* (Fig. 16.) to receive the lower end of the angular ſide, *o b c* (Fig. 13.) of the plank.

The ſole *e a* (Fig. 15.) or *a d* (Fig. 16.) is of the ſame length and breadth as at the bottom *c m*, or *o n* (Fig. 13.) of the plank which it covers. It is about, but not more than two thirds of an inch thick towards *e h* (Fig. 15.) and half an inch thick at its end *a c*,

Towards this end are the two thin iron ears, which lie cloſe to the two ſides of the plank, to which they are faſtened by a ſingle nail, which paſſes through the plank, as at *b*, Fig. 17.

This ſhare is alſo faſtened to the bottom of the plank by a flat-headed iron pin, *g h*, Fig. 15. which goes through the ſhare at *n*, and enters into the middle of the thickneſs of the plank. The head *h* of this pin is flat, and lies even with the bottom of the ſole, in the manner indicated by the pricked lines at *a*, Fig. 17. Towards the flat end *c* of this pin is a hole, through which, and through the plank, a ſmaller pin or nail is driven, and is denoted by the pricked circle in the ſame figure.

The point of the ſhare, and the bottom of the ſole, which rubs upon the ground, ſhould be of ſteel. The different thickneſſes given to the ſole, ſhew that its point inclines a little downward, by which means it enters into the earth very eaſily.

Fig. 18. repreſents a perſpective view of a thin plate of iron, which is to cover the plank of the ſhare, as in Fig. 20. to preſerve it from the friction of the ground, which would otherwiſe ſoon wear it out. The thickneſs of this plate, which ſhould be equal every where, is at moſt one twelfth of an inch. It is bent at *a b*, Fig. 18. in ſuch manner that this bending fits cloſe to the ſharpened edge *c d*, Fig. 20. of the plank; the angle *b*, Fig. 18, being fitted to the notch *c* (Fig. 20.) in the iron part of the ſhare, and the lower edges *b c*, *a d*, of this plate (Fig. 18.) joining on both ſides to the upper edges of the ſole of the ſhare, as in Fig. 20. The breadth of this plate from *a* to *b* (Fig. 20.) is about four inches, and each half of its length, from *c* to *a*, or from *d* to *b*, is about ſeven inches and a half. Fig. 19 is the plan, or bottom of this plate.

As this plate covers the ears of the ſhare, and at the ſame time its own angle *c* (Fig. 20.) is covered by the point of the ſhare, theſe two pieces muſt be put on together. This plate is nailed to the two oppoſite ſides of the plank.

The two ends of this plate extend beyond the hindmoſt part of the plank of the ſhare, in the proportion of *b b*, Fig. 20: and in this ſpace, between theſe two ends, is the opening of the pipe through which the ſeed drops into the furrow, as was ſaid before.

The tenon *l g* (Fig. 12.) of the ſhare now deſcribed, (and there are three ſuch) enters into one of the three mortiſes, P, Q, R (Fig. 2.) through the bottom of which it is paſſed, and is fixed above by a wedge driven into the hole *k* (Fig. 12.) Theſe ſhares are ſituated in ſuch manner, that their point faces directly to the fort-part of the drill. One of them is repreſented as fixed towards the end *b* of one of the beams, in Fig. 3, which exhibits the profile of that beam.

Of the Piece which is placed under the Middle of the Table, and which bears the Middle Share, Plate XI.

The piece K L (Fig. 2, Plate X.) which has been already ſpoken of, is repreſented with its bottom upward, and in perſpective, at *a b*, Fig. 21. Plate XI. with the ſhare A, and its tenon B, and with the table, which are alſo inverted in the ſame manner. Fig. 22. is a geometrical repreſentation of the under ſide of the ſame piece, and of part of the table, excepting the ſhare which is omitted here, and of which only the bottom of the mortiſe is ſeen at B.

At the end L of this piece (Fig. 22.) is faſtened the rein, or bridle before mentioned. This bridle is ſhaped nearly like a horſe ſhoe; the breadth of each of its branches is three fourths or five ſixths of an inch; its total breadth is the ſame as that of the piece to which it is faſtened; its total length is three inches and a half, and its thickneſs every where is about one ſixth of an inch. The whole thickneſs of the two branches of this bridle is let into the piece of wood to which it is faſtened; ſo that it forms an even ſurface. This bridle is faſtened to the piece by two flat-headed ſcrews, which lie even with the branches of the bridle, through and into which they are ſcrewed. It is placed in ſuch a manner, that the outſide of its circular part L, is one inch and a quarter diſtant from the edge *e f*, of the table. It is uſed only when the drill is put upon its hind carriage.

a and *b* are the heads of two large flat-headed ſcrews, which paſs through the piece K L, and fix it to the table. From the center of the head *b*, to the edge *c d* of the table, is one inch and two thirds. From the center of the head *a*, to the edge *e f* of the table, is one inch and one third. Theſe two ſcrews are placed in the middle of the branch of this piece L K. Their diameter is five twelfths of an inch, and that of their head is an inch and a twelfth. Theſe heads are flat, and ſcrew in a level with the wood.

Of the two Bridles which receive the End of the Bar which ſupports the Drill upon its Hind-carriage, Plate XI.

Underneath this piece K L, are likewiſe faſtened two bridles very like each other. They are repreſented in perſpective by the ſingle figure 23; but both of them may be ſeen in their proper places, at *g h* and *e f*, Fig. 21. Their place in Fig. 22 is marked only by pricked lines, in order to let the pieces under them be ſeen. Theſe two bridles are made of a flat piece of iron, one inch and a ſixth wide from *a* to *b*, or from *c* to *d* (Fig. 23.) and a very little more than one ſixth of an inch thick. They are bent ſquare at *c d* and *f g*, and are pierced with two holes, *b* and *e*, one fourth of an inch in diameter, of which the centers are three fourths of an inch from the ends of the iron. Thus far theſe two bridles are like each other. What they differ in, is as follows. That which is placed at *g h*, (Fig. 21.) is three inches and one ſixth high, from its bottom *a*, to the upper ſurface of its top *c*, or from *e f*, Fig. 23; and this height in the belt which is placed at *e f* (Fig. 21.) is three inches and five twelfths: That which has placed at *g h*, is two inches and five ſixths long, from its outſide at *c d*, to its outſide at *g f*, (Fig. 23.) and this part of the bridle placed at *e f*, is three inches and one third.

Both theſe bridles placed at *g h* and *e f* (Fig. 21.) go over the piece of wood *a b*, to which their ends are faſtened by flat headed ſcrews, which paſs through the holes *b* and *e* (Fig. 23.) beforementioned. Theſe ends reſt immediately upon the table. As the diſtance between the ends of the bridle *e f* is exactly equal to the breadth of the piece to which they are faſtened, they are applied to the two lateral ſurfaces of that piece, without being let into it: but as the bridle *g h* is not quite ſo long, the ends of this are let into thoſe ſurfaces, as is ſeen in Fig. 21. and in the pricked plan of theſe two bridles, *h i*, *k n*, Fig. 22. The ends of theſe bridles ſtand perpendicular to the table. The bridle *g h*, Fig. 21, is one inch and fifteen twenty fourths from the edge *t s* of the table; and the bridle *e f* is five inches and eleven twelfths diſtant from the ſame edge *t s*.

The uſe of theſe two bridles is to receive the end of the bar hereafter deſcribed, which ſerves to ſupport the drill upon its fore-carriage, when the hind-carriage is joined to it: and to prevent this end of the bar from ſlipping out of theſe bridles, a moveable iron pin is put through it. This pin is ſuſpended by a piece of pack-thread. It paſſes through the bridle L (Fig. 2. Plate X. and 22. Plate XI.) and *b* (Fig. 21,) before deſcribed.

Of the upper Surface of the Table, Plate XI.

Fig. 24. repreſents a geometrical plan of the upper ſurface of the table, one end of which is omitted, as ſuperfluous in this figure, becauſe both its ends are alike. The pricked line *l b* is traced here only to mark the middle of the table, and determine ſome meaſures. The fore-ends of the beams appear here at *f* and *g*, with their mortiſes A and B, into which their ſhares are faſtened. C, D, E, F, are the four large flat-headed ſcrews which faſten the table to the beams. The diameter of theſe ſcrews towards their head is five twelfths of an inch, that of their head is one inch and a twelfth, and their length is three inches and ſeven twelfths. They enter into the middle of the breadth of the beams, and the centers of the holes in the tables through which they paſs, are eleven twelfths of an inch diſtant from the neareſt edges of the table. The whole breadth of the table, at C D, or E F, is eight inches and two thirds. The two corners G and H are thirteen inches diſtant from the middle line *l b*, and the end K is one foot three inches and three fourths diſtant from the ſame line *l b*. The thickneſs of this table is every where one inch and two thirds.

At each end of the table is a notch K L P, of which the inner ſurfaces are perpendicular to each other. Theſe notches are at H and L in Fig. 1. Plate X. Each of them is three inches and three quarters, from K to L, Fig. 24. and one inch ſeven twelfths wide from L to P. They are ſituated in the middle of the breadth of the table. Their uſe is to receive the lower end of two ſtandards hereafter deſcribed (Fig. 34.) of which one is ſeen at M H, Fig. 1. and the baſe of the other towards L.

This table has two holes, M and N (Fig. 24.) of which the upper openings are exactly equal, and alike ſituated, each of them forms a right angled parallelogram *a h i n*. The ſide *h i* is parallel to the edge D F of the table, from which it is one inch and an half diſtant, and its length is three inches and a quarter.

The upper edge of the end *a n* is eleven twelfths of an inch diſtant from the middle line *l b*, and its length is one inch and eleven twelfths. The inner and parallel ſides *a h*, *n i*, of theſe holes are perpendicular to the upper ſurface

face of the table; but their ends *a n*, *b i*, are ſloped, in ſuch manner, that each of them forms an angle of fifty or fifty-five degrees towards the line *l b*. This is expreſſed in the profile of theſe two holes (Fig. 25.) by the angles *b a d*, *b c e*, and *g o f*, *g n h*, each of which has that meaſure Q, R, S, T, are four mortiſes, of equal ſize and depth, cut perpendicularly to the upper ſurface of the table. Each of them is nineteen twenty-fourths of an inch long in the ſame direction as the length of the table, two thirds of an inch wide, and about one inch deep. They are intended to receive the four feet of the hopper, which will be deſcribed hereafter. Two of theſe feet are ſeen in their mortiſes at *k* and *l*, Fig. 1. Plate X. The centre of each of theſe mortiſes is ſix inches and five twelfths diſtant from the line *l b* (Fig. 24.) and an inch and three quarters from the edges C E, D F, of the table.

Of the Bridles which receive the End of the Bar which ſupports the Drill upon its Fore-carriage, Plate XI.

From *k* to F, Fig. 24. is a bridle which is ſeen in front in Fig. 26. It is made of iron, one inch or one inch and a twelfth broad, and one ſixth of an inch thick. It is bent in a ſemi-circle at *a c b*, and lies flat upon the table at its end *a* and *b*, which are faſtened to it by two flat-headed ſcrews *a* and *b*, Fig. 26. and *k m*, Fig. 24. This bridle is perpendicular to the upper ſurface of the table. The higheſt part of the upper ſide of its arch *c* Fig. 26. is two inches above the table; and its width, from outſide to outſide, from *e* to *i*, is two inches and a half. The length of each ſtrait part, or claw, which is faſtened to the table, is one inch and a quarter. The centers of the ſcrews *k* and *m* (Fig. 24.) are each one inch and three quarters from the middle line *l b*, and four inches from the edge D F of the table.

d r q (Fig. 26.) is the upright of another bridle, of which the top, or upper ſurface, is ſeen at *x d p q*, Fig. 24. the front and ſide in the perſpective figure 27, and the back and ſides in the perſpective figure 28. The hinder ſurface of the two claws, repreſented at *a* and *c* (Fig. 28.) is ſcrewed on to the fore-ſurface of the table, as at *f g* and *h k*, Fig. 26. by two flat-headed ſcrews, each of which is one inch and ſeven twelfths long, and near a quarter of an inch in diameter towards its head, which is half an inch in diameter. The middle of this bridle anſwers to the middle of the length of the table. The under ſurface of the bridle, and of its wings, anſwers to the plane of the fore ſurface of the table, to which it is faſtened. The length of each wing is about two inches and a half; their breadth is five ſixths, and their thickneſs a quarter of an inch. The length and thickneſs of its arched part are equal to thoſe of the wings. The bending of that part is ſuch as is repreſented at *g d r q h*, Fig. 26. The diſtance *g h* between the two wings is one inch and eleven twelfths. The greateſt width of the bridle, from outſide to outſide, as at *d q*, is two inches and three fourths; and laſtly, the upper ſurface of its higheſt part *r*, is one inch and two thirds above the upper ſurface of the table.

The uſe of theſe two bridles is to receive the end of the bar which will be deſcribed hereafter. This bar is ſeen at *x d*, Fig. 1, Plate X. where one of the rings appears towards *d*. A wooden wedge *o t* (Fig. 24. plate XI.) is ſlipped, if there be occaſion for it, between this bar and the table, to which laſt it is faſtened by a ſingle flat-headed ſcrew *t*, around which it turns, as around a center. The ſhape and extent of this wedge is ſuch as is here repreſented according to the ſcale. Its thickneſs, throughout, is ſeven twelfths of an inch, excepting only at the part *r o e*, where its upper ſurface inclines from *r*, to *o e*, in ſuch manner, that the edge *o e* is almoſt ſharp, that it may ſlide, like a wedge, under the end of the abovementioned bar, which paſſes through the two bridles or belts. The length of this piece is five inches and one twelfth, from the center *t*, to its end *a e*. This center *t* is ſix inches and one ſixth from the edge D F of the table, and four inches and a quarter diſtant from the middle line *l b*. We ſhall hereafter ſee, that the bar which enters into the two belts now deſcribed, ought not to fill entirely the belt *a b c*, Fig. 26. but ſhould leave room to introduce under it the wedge juſt ſpoken of, which is not to be inſerted but when it is intended to make the other end of the bar preſs hard upon the axle-tree of the fore-carriage, which ſhould never be done at the time of ſowing, unleſs the huſbandman would ſcarcely bury the ſeed.

Of the two Pipes of the Shares of the Beams, Plate XI.

Through the two holes M and N of the table (Fig. 24) paſs two braſs pipes, which deſcend to, and open at, the back of the ſheers faſtened in the mortiſes A and B of the two beams. Theſe pipes are ſeen at *d* and *f* in Fig. 1, from whence they paſs through the two holes in the table, and terminate behind the two ſhares D and K, as is repreſented in perſpective in Fig. 29. Theſe two pipes *f p a i k*, and *o r n l*, (Fig. 29) are perfectly alike. They are almoſt ſquare during their whole length; wider towards the end *f d*, than towards the end *k*; and they are made of plates of braſs, ſomewhat leſs than a twelfth of an inch thick, well ſoldered together. Their opening at *f d* forms a parallelogram, which is an inch and one ſixth wide from *b* to *f*, and an inch and three quarters long from *b* to *d*. The plane or perpendicular projection of theſe openings in the table, is indicated in Fig. 24. by the pricked lines between the letters M and N, where it is to be obſerved, that they are both equally diſtant from the middle line *l b*, and an inch and a half from the edge D F of the table. All the rims of theſe openings, *f*, *b*, *d*, *h*, *o*, (Fig. 29.) are nearly parallel to the upper ſurface of the table, above which they riſe two inches and two thirds. As theſe two pipes are alike, and ſituated in the ſame manner one on the right, and the other on the left hand ſide of the drill, it will be ſufficient to apply to one of them, what remains to be ſaid of both. This pipe runs in a ſtrait, but oblique line, from its opening *f d* to *i*, directly behind and under the ſhare, from whence its direction becomes perpendicular to its other opening *k*, which is at the height of three inches and a quarter from the bottom *g* of the ſhare. From its bending at *i*, to the opening *k*, is three inches. This opening *k* is a ſquare, of which the ſides are two thirds, or three quarters of an inch long.

This pipe is held to the ſide *p* of the hole, by a piece of iron which is under the table; and it is alſo faſtened near the bending *i*, by another piece of iron fixed under the beam. Theſe faſtenings are ſeen in Fig. 30. which repreſents, in perſpective, the bottom C D of the table E F of the beam on the right-hand ſide of the drill, and the ſhare G which is faſtened to it. *q l* is the upper opening of the pipe, which runs from thence cloſe to the ſide *a b* of the hole of the table, where it is faſtened by a plate

of iron, *n x*, about one eighth of an inch thick. In this plate is a notch which fits close to three sides of this pipe. This plate is fastened to the under surface of the table, by two flat-headed screws, *x* and *n*. The pipe continues in the same direction from its upper opening *q l*, to its bending at *e*, behind the share; but from thence to *f*, it follows the direction of the back of this share. It is fastened towards this bending by an iron square, *k i h g*, the thickness of which is about one eighth of an inch. This square is fastened under the beam by two flat-headed screws, *k* and *i*, and to the pipe by two other screws, *g* and *h*, the ends of which screw into a piece of iron, which is soldered to the pipe, and which is seen between the square and the pipe, from *f* to *e*. The beam A B has a shallow notch at *d*, to make room for the passage of the pipe.

Of the Pipe of the middle Share, Plate XI.

The two pipes which terminate behind the two shares fastened near the ends of the beam at Q and R (Fig. 2, Plate X.) have now been described. A third pipe, of nearly the same form, terminates behind the third share, which is fastened at P, in the piece K L. This is the pipe which passes between U and *y*, in order to its terminating behind the share *e* C.

This piece K L is represented in perspective at A B, Fig. 31, Plate XI. which shews its right side, with its share C, and the portion of the middle of the table, where are the two holes D, E, through which pass the two pipes beforementioned.

This third pipe is made like the two others, of plates of brass, of the same thickness and the same shape. Its opening *b l* forms a parallelogram of nearly the same size as the similar openings of the two other pipes. The plane of this opening, or its perpendicular projection, upon the table, is indicated by pricked lines near *o c e*, Fig. 24. where it is to be observed, that the middle of this parallelogram is in the middle line *l b* of the table, and that its side *c e* is five inches and five twelfths distant from the edge D F of the table. The rims of this opening *b l* (Fig. 31.) are raised about two inches above the upper surface of the table. From thence this pipe descends in a strait, but oblique line, towards the share which is behind the table; and at the same time bears to the right to *d* and *c*, where it bends, in order to take the direction of the lateral surface of the piece A B, against which it rests. From thence it continues in this direction to *r*, where it bends again, to *p*, immediately behind the share; and there it is bent again, so as to descend perpendicularly behind this share, down to *k*, which is within three inches and a quarter of the bottom of the share G.

The table is notched at H, to let in one side of the pipe. This notch is also seen at R, in Fig. 24. The pipe is fastened in this place by an iron plate *e f*, Fig. 31. about one eighth of an inch thick, which is fixed upon the table by two flat-headed screws near *e* and *f*. This piece is represented by itself in Fig. 32. *m n*, Fig. 31. is a piece of iron, at least one sixth of an inch thick, fastened by two screws, at N, against the side of the piece of wood A B. into which the thickness of this iron is let, as may be seen at *m*, in such manner that the outward surface of this piece *m n*, is level with that of the piece of wood A B. The pipe is fastened against this piece of iron *m n*, by a belt fixed by two screws to the piece of iron *m n*. This belt is represented by itself in Fig. 33.

Of the Standards, Plate XI.

In the notches Æ W at the two ends of the table, Fig. 2. Plate X. are placed two standards, represented in perspective in Fig. 34. Plate XI. with the two ends of the table, of which the middle is suppressed, as needless in this representation. These two standards being exactly alike, it will be sufficient to describe one of them.

In each standard may be distinguished three parts, namely, the head, which reaches from the line *p a* to the top of the moulding *b d s*; the base, which extends from the top *b d s* of the moulding, to the under part of the shoulder *f u q*; and the tail or tenon, which begins at the bottom of the shoulder.

All the sides of this standard are at right angles to each other, excepting only the two indentures *p* and *a* in the head, and the mouldings at the base. The inner surface A B, which faces the other standard, is every where an even plane.

The head is three inches and a quarter wide, from *b* to *d*; two inches and one sixth thick, from *d* to *s*; and seven inches high, from the line *b d* to the line *p a*.

The base is four inches and five sixths wide from *f* to *u*; two inches and five sixths thick from *u* to *q*; and two inches and a half in perpendicular height from *f u* to *b d*.

The tail or tenon, which proceeds from the lower middle of the base, is equal in breadth *g h*, to the breadth *u q* of the base, that is to say, it is two inches and five sixths wide. Its length, *t g*, is six inches and a quarter. Its thickness is the same as the width P L (Fig. 24.) of the notch in the end of the table, which receives the tenon; that is to say, one inch and seven twelfths. The hole or mortise *k n* is in the middle of the breadth of the tenon, and forms a right angled parallelogram, two inches long from *m* to *k*, and eleven twelfths of an inch wide from *n* to *m*. The height of this hole is determined by the thickness of the table, in such manner, that the distance between the bottom *f u q* of the base, to the top *n m* of the hole, is somewhat less than the thickness of the table.

Each standard is fastened to the table, as may be seen in the figure, in the same manner as a common turning lathe is fastened, by a key D, about eight inches and a half long, driven tightly up to its middle, in that part of the mortise which is under the table; and for greater solidity, one of the keys is put in at the fore part of one mortise, and the other at the hind part of the other.

A round hole, one inch and five twelfths in diameter, is bored through the head of the standard, near A. The center or axis of this hole is exactly in the middle of the breadth of the head, and the hole is made through it exactly horizontal to the upper surface of the table, or, in other words, perpendicular to the side of the standard. The pipe *n o* of the ferrule, Fig. 35. is put into this hole. The diameter of this pipe is the same as that of the hole. The pipe *n o*, is of one piece with its scutcheon *a b d*, which is one-third of an inch thick: its breadth *a b* is one inch and five-sixths, and its length *b d* is three inches. All its surfaces are at right angles, and parallel to each other. The axis of this pipe is in the middle of its scutcheon, and perpendicular to its surface. Both the scutcheon and the pipe (being but one piece) are bored through with the same hole, which is five-sixths of an inch in diameter; and in the upper surface of the inside of this hole is a groove, which reaches from one end to the other. One end of it is seen at *n*, and

and its uſe will ſoon then be ſhewn. The end *n o* of this pipe is put into the hole A of the ſtandard (Fig. 34.) at the inner ſide A B of this ſtandard, and the ſcutcheon *a b d* (Fig. 35.) is let into this ſurface at *c i* (Fig. 34.) where it is faſtened by two ſcrews, of which the ends are ſeen at *c* and *i*, in this figure, and at *e* and *r* in the adjoining repreſentation of the outſide of the other ſtandard. The two ſmall holes in the ſcutcheon are female ſcrews, to receive the ends of the ſcrews before mentioned, which are one-third of an inch in diameter, and their heads are two-thirds. The outer ſurface *c i* of the ſcutcheon is made to lie exactly even with the inner ſurface of the ſtandard, and the center of its pipe is at the perpendicular height of five inches, and ſeven-twelfths above the ſurface of the table. Theſe two pipes (one in each ſtandard) are deſtined to receive the two pivots *a b*, *g h*, of an iron axis; and the groove *n*, (Fig. 35.) then becomes uſeful, by affording the means of introducing a little oil, to keep the pivots from loſing their temper by their friction, and to make them turn with the greater eaſe.

The ſcutcheon and its pipe ſhould be caſt in one piece of good metal, ſufficiently hard, but by no means brittle.

Of the Axis, and the Pieces which are faſtened to it, Plate XII.

The pivots are of the ſame diameter as their holes; and their ſhoulders *b* and *h* (Fig. 36.) are at the ſame diſtance from each other as the inner ſurfaces of the ſtandards, that is to ſay, two feet.

The axis is repreſented naked in Fig. 36; but the ſeveral pieces repreſented ſeparately in figures 37, 38, 40, 41, 42, 43, 44, 45, and 46, are to be faſtened to it.

(Fig. 39.) repreſents all theſe pieces fixed upon the axis. It is to be obſerved here, that the long pivot *c* (Fig. 39.) goes through the hole of the ſtandard which is on the left-hand ſide of the drill, and the pivot *r* through the ſtandard on the right-hand; ſo that all theſe figures exhibit a front view of the axis and its pieces.

The pivot *a b* (Fig. 36.) on the right-hand ſide, is one inch and a quarter long; and that on the left, *h g*, about two inches. The diameter of the axis towards the ſhoulder *b* and *h* is one inch and a twenty-fourth part of an inch. From thence it thickens gradually to near the middle of its length, in order to facilitate the fixing of the pieces which are to be ſlipped on, over its two ends. In the middle, its diameter is one inch and an eighth.

The firſt piece which is ſlipped over its end *g* (Fig. 36.) is repreſented in perſpective in Fig. 37: a ſection of it is ſeen in Fig. 38, and it appears in profile at *g a b q* in Fig. 39. It is a hollow cylinder, of which the outer diameter *a b* (Fig. 37.) is one inch and thirteen twenty-fourths of an inch. It has a ſhoulder, of which the total diameter *e d* (Fig. 38.) or *g q* (Fig. 30.) is three inches and five twelfths. Its thickneſs from *a* to *b* (Fig. 38.) is ſeventeen twenty-fourths of an inch; and the thickneſs *n m* of the ſhoulder is one-ſixth of an inch. This hollow cylinder and its ſhoulder are made of the ſame piece of braſs, caſt in a mould, and afterwards turned. The diameter of the hollow of this cylinder is the ſame as that of the middle of the axis, upon which it goes very tightly, and is faſtened, as in Fig. 39, by a riveted pin *n*, one-ſixth of an inch in diameter, which paſſes through the axis and the cylinder. This cylinder is placed in ſuch manner that its rim *a b* is eight inches and fifteen twenty-fourths of an inch diſtant from the ſhoulder *e* of the axis Fig. 39. or from the ſhoulder *b* (Fig. 36.)

After this cylinder is firmly fixed, another hollow cylinder, repreſented in perſpective in Fig. 40, is forced over the end *g* of the axis Fig. 36. Its end *g* is put on firſt, and forced forward, till the edge of its other opening *a b* (Fig. 40.) is about a twelfth part of an inch beyond the ſhoulder *b* of the axis Fig. 36. The reaſon for putting it thus a little beyond the ſhoulder *b*, is, that it may not touch the pipe of the ſtandard when it turns.

This cylinder (Fig. 40.) has, nearly in the middle of its length, a ſhoulder, of which the flat ſide *f d*, which is alſo repreſented in full view in Fig. 41, forms a circle perpendicular to the axis of the cylinder. This circle or ſhoulder is four inches in diameter, and a quarter of an inch thick towards its edge; but it is thicker towards the middle, as is ſeen in its profile at *d* (Fig. 39.) The whole length of the cylinder between its two ends *a b* and *g* (Fig. 40.) is three inches; and the diameter of its thickneſs at each end, *a b* and *c*, is one inch and five-twelfths: the length *n a*, from the end *a b* to the flat ſide *d f* of the ſhoulder, is one inch and nine twenty-fourths.

This cylinder and its ſhoulder are of one piece of braſs, caſt in a mould, and turned in a turner's lathe. When put upon the axis, over which it goes very tight, in ſuch manner that, as was ſaid before, its end *a b* (Fig. 40.) is placed about a twelfth part of an inch within the ſhoulder *b* of the axis (Fig. 36.) It is faſtened by a pin which goes in at the hole *c* (Fig. 40.) and paſſes through the axis. This pin, which is of iron, and one-ſixth of an inch in diameter, goes tight through the cylinder and the axis, without projecting at either of its ends. The cylinder is repreſented as pinned at N (Fig. 39.)

Fig. 42, is a wooden pully, of which a part is ſeen at F, (Fig. 1, Plate X.) and of which the hole in its center is of the ſame diameter as the end *a b* of the cylinder (Fig. 40, Plate XII.) This end of that cylinder is put through this pully, which is every where one inch and a quarter thick, that is to ſay, ſomewhat leſs than the length of the end *n a* of the cylinder (Fig. 40;) ſo that when the pully is put upon the cylinder, and its ſide is placed againſt the ſhoulder *d f*, the end *a b* of the cylinder projects a little beyond the other ſide of the pully, to prevent its rubbing againſt the adjoining ſtandard. This pully is repreſented in profile at *l m* (Fig. 39.) Its extreme diameter, *f k*, is eight inches; and its groove *l m*, which is ſquare, is an inch and a quarter deep, and three quarters of an inch wide. This pully is placed cloſe to the braſs ſcutcheon, to which it is faſtened by three ſcrews A, B, C, (Fig. 42.) which ſcrew into the three holes *a*, *b*, *c*, (theſe being female ſcrews) in the flat part of the ſhoulder (Fig. 41.) of the cylinder (Fig. 40.) Each of theſe ſcrews (Fig. 42.) is from a quarter to a third part of an inch in diameter; and their head, which is flat, is about a quarter of an inch thick, and two-thirds of an inch in

diameter. Theſe heads are ſcrewed into the holes *a b* and *c*, till they lie even with the ſurface of the pully on that ſide.

To the other end *b* of the axis (Fig. 36.) is fitted exactly, though ſo as to ſlip on with eaſe, a third hollow cylinder (Fig. 43.) of which the profile is ſeen at *b* (Fig. 39.) It is like that which is marked N *d* at the other end of the axis; with this only difference, that the extreme diameter of the end *b e* of the cylinder (Fig. 43.) is about two inches. This cylinder is faſtened to the axis by a thumb-ſcrew *e*, which goes through a female ſcrew in the cylinder, and of which the end enters into the hole *l* in the axis (Fig. 36.) which is not a female ſcrew: and that the end of the ſcrew may be directed to this hole, without any difficulty, when the cylinder is upon the axis, this laſt is provided with a ſmall tongue *k*, which goes exactly into the notch *f*, (Fig. 43) as is ſeen at *e*, (Fig. 39.)

A pully exactly like the former is faſtened to the ſhoulder of this cylinder, by three ſimilar ſcrews, and in the ſame manner: obſerving equally here, that the outer ſurface of this pully does not rub againſt its adjoining ſtandard. This pully is ſeen at Q, (Fig. 1. Plate X.)

It is ſometimes neceſſary to take this pully and the cylinder off from the end *r* of the axis (Fig. 39.) which is the reaſon why this cylinder is faſtened by a ſcrew, and not by a pin, like the other. They are taken off, to make room for putting upon the axis the cellular cylinder, which is of caſt braſs, and turned in a lathe.

Of the cellular Cylinder, Plate XII.

This cylinder is ſeen in profile, upon the axis, at *p*, *y*, *g*, *q*, *t*, *z*, (Fig. 39.) and in perſpective in Fig. 44. Fig. 45 repreſents its longitudinal ſection. The part of this cylinder which is between the two lines *y t* and *p z*, (Fig. 39.) is exactly like the above deſcribed cylinder Fig. 37 and 38, and *g*, *a*, *b*, *q*, (Fig. 39.)

The only difference between them is, that the one is fixed permanently to the axis, by a pin *n*, (Fig. 39.) and the other is faſtened by a ſcrew *v*, which paſſes through a female ſcrew near the end of the cylinder, which is ſtrengthened there for that purpoſe, by a moulding or collar *p z*. The end of this ſcrew enters into a hole *m* in the axis (Fig. 36) but this hole is not a ſcrew. The other part of the cellular cylinder included between the two lines *y t* and *g q*, (Fig. 39.) is three inches and five-twelfths long; its outward diameter, throughout this length, is two inches and twenty-one twenty-fourths of an inch; and its inner diameter is two inches and a third. This inner diameter is a little wider towards the end *b c* of the cylinder, (Fig. 44 and 45.) It is exactly the ſame as the outer diameter of the projecting part *c d* of Fig. 37, which is to go into; and fit cloſely to the end *b c* of the cellular cylinder, (Fig. 44.) ſo that the edge of this end *b c* may run quite up to the flat ſide of the ſhoulder of Fig. 37. The pricked lines in Fig. 45 and 38, are intended to expreſs the correſpondence of the parts of theſe two cylinders, which are to be united, by putting the end of one into the end of the other. Fig. 39 ſhews the cellular cylinder joined to the ſhoulder of the other cylinder: in which poſition it is that the cellular cylinder is faſtened to the axis by the ſcrew *v*, as before ſaid: and that the end of this ſcrew may be directed ſtrait to the hole in the axis; whenever this cylinder is put on, two contiguous lines or marks may be made, one upon the edge *p z* of the cylinder, and the other upon the axis.

Of the Cavities of the cellular Cylinder, Plate XII.

On the ſurface of this cylinder, between the lines *y t*, and *g q* (Fig. 39.) are ſcooped hollows or cavities, repreſented at large in Fig. 47, N°. 1, and ſeen in profile in Fig. 47, N°. 2. They are ſhaped nearly like a niche, which terminates in a cone at its top, and is rounded gradually deeper and deeper down to its bottom, which is a flat, perpendicular to the loweſt part of the cavity.

To conceive and fix the poſition of theſe cavities upon the cylinder, the two pricked lines *i x*, *o s* (Fig. 41.) muſt be drawn round the cylinder, at equal diſtances from the lines *y t*, and *g q*, and diſtant from each other two inches and one-third, which is the inner breadth of the ſeed-box in which the cylinder is placed, as will be more particularly explained in the deſcription of it.

The breadth between the lines *i x*, and *o s*, muſt then be divided into ſix equal ſpaces, by five other parallel lines drawn round the cylinder. Each of theſe ſpaces marks the width of each row of cavities; and theſe ſix rows of cavities muſt face exactly the ſix valves of the bin, which will ſoon be ſpoken of.

After this, the places muſt be marked for twelve ſimilar cavities, placed at equal diſtances from each other, in each of the breadths traced round the cylinder; obſerving, that the length of the cavities is to be in the ſame direction as thoſe breadths; and alſo, that the flat end of each cavity muſt be undermoſt, and the rounded end uppermoſt, when the cylinder fronts the fore-part of the drill, which is the view repreſented in Fig. 39; for it is the flat end of the cavities that is to go foremoſt, when the cylinder turns and drops the ſeed.

It is likewiſe to be obſerved, that each cavity ſhould be oppoſite to the interval between two cavities in the next adjoining rows, as they are placed in Fig. 39, 44, and 47.

It will be right to have two or three, or even more, cellular cylinders, equally fitted to the axis (Fig. 39.) but with cavities of different ſizes, in order to be thereby enabled either to ſow more or leſs ſeed, or ſmaller or larger ſeeds, ſuch as barley, lentils, peaſe, beans, millet, oats, &c. for each of which its proper cylinder ſhould be uſed.

The cavities in Fig. 47, N°. 1 and 2, are of a ſize fit for wheat, barley, lentils: for millet, they muſt be much ſmaller; for peaſe, ſomewhat deeper; for oats, there ſhould be but eight or nine cavities in each row, in order that thoſe cavities may be made longer than for wheat, on account of the length of the oat, which is the only ſeed that I have found leſs eaſy to ſow than wheat: the reaſons are, the lightneſs of oats, their not ſlipping eaſily between each other, and their having at one end of the grain a pretty long, flexible, and elaſtic point. Theſe obſtacles ſometimes hinder the grains from entering into the cavities, and the ſeedſman muſt be more careful when he ſows oats, than when he ſows any other kind of grain; though, notwithſtanding theſe difficulties, I have had them ſown pretty well.

To ſow beans, the cylinder muſt have but three rows of cavities, of a length, breadth, and depth proportioned to the ſize of the beans. The bin, which has ſix valves for wheat, ſhould have but three for beans, and theſe valves ſhould be proportioned to the breadth of the cavities, which muſt be placed exactly oppoſite to them, as for wheat.

The following rule will determine the proper ſize of the cavities; by applying, as may eaſily be done, what is here ſaid of wheat to any other kind of grain.

The cavities muſt be large enough to contain three or four grains of wheat, and their depth muſt be ſuch that theſe grains do not riſe above the ſurface of the cylinder, in order that when the cavities filled with ſeeds, paſs under the valves of the bin, the grains may not fall out of the cavities. This will be ſtill better underſtood, after reading the deſcription of the ſeed-box.

Of the Seed Box, Plate XII. *and* XIII.

After unſcrewing and taking off from the axis, the pully A B (Fig. 39.) its cylinder *h*, and the cellular cylinder *p z*, *g q*; the ſeed-box (Fig. 48.) is placed upon the axis, by running the barred end of this laſt through a round hole in each of the two parallel ſides of the ſeed-box. The diameter of theſe holes is the ſame as that of the cellular cylinder, which is then to be put over the axis, by paſſing its proper end through the hole to the ſide of the ſeed-box, which it traverſes, and faſtening it in the manner before directed. The pully is alſo then to be replaced. The front of this box is ſeen at B (Fig. 1, Plate X.)

Fig. 49 repreſents the box and the cellular cylinder placed upon the axis, where it is to be obſerved that the outer breadth of the box, expreſſed by the interval between the lines *d c* and *k l*, is exactly the ſame as the length of the cylinder expreſſed in Fig. 39, by the diſtance between the lines or ſhoulders *y t*, and *g q*; ſo that the box is held between theſe two ſhoulders *y t*, and *g q*. It is alſo to be obſerved, that the inner breadth of the box, expreſſed by the interval between the lines *f g*, and *h i*, in Fig. 49, is exactly the ſame as the length of the cylinder expreſſed by the lines *i x*, and *o s*, in Fig. 39.

This braſs-box has neither cover nor bottom, but is formed of four plates, each five twenty-fourths of an inch thick. Fig. 50 repreſents the inſide of the plate F G, (Fig. 48.) which is on the left-hand ſide of the drill, with the pieces which the box contains, and a ſection of the cylinder, lengthways of one of the rows of cavities. Fig. 51 repreſents the outſide of the plate oppoſite to the former, and which conſequently is on the right-hand ſide of the drill.

Theſe two plates (Fig. 50 and 51.) are exactly equal. Each of them forms a parallelogram, of which the length A B (Fig 50 and 51.) is four inches and eleven twelfths, and the breadth B E four inches and fifteen twenty-fourths. Both of them are perforated by a large round hole, of the ſame diameter as that part of the cylinder in which are the cavities. The center of this hole is in the middle of the breadth of theſe plates, and the upper extremity *b*, of this hole (Fig. 50 and 51,) is an inch and one-ſixth diſtant from the upper edge, D A, of the plate. Both the plates have four mortiſes, G, H, K, L, (Fig. 51.) the breadth of which is equal to the thickneſs of the plates, and the length about half an inch; though this laſt is almoſt arbitrary. Both of them have alſo, directly facing each other, a hole at *n* (Fig. 50 and 51,) three twenty-fourths of an inch diameter, and of which the center is at the diſtance of five twenty-fourths of an inch from the line D A, and half an inch from the line A B. The inner ſurface of both the plates is even; and laſtly, each of them has, on its outer ſurface, a ſhoulder which projects round the rim of the great hole. One of theſe ſhoulders is ſeen in perſpective in Fig. 48. The profile of one of them is ſeen between the lines *d c* and *f g* (Fig. 49.) and that of the other between the lines *h i* and *k l*. Fig. 54 repreſents a ſection of them both. The thickneſs of this ſhoulder, that is to ſay, the diſtance to which it is to project, has already been determined by the total diſtance between the lines *y t* and *g q* (Fig. 39.) When the inner ſurfaces of theſe two plates (Fig. 50 and 51.) are laid againſt each other, their edges and holes, now deſcribed, ſhould coincide exactly.

What they differ in is, firſt, that one of them (Fig. 51.) has a ſmall opening M N, which the other has not, and which will be deſcribed in its proper place; and ſecondly, that the hole *n* (Fig. 50 and 51.) is a female ſcrew in Fig. 50, to receive the end of a ſcrew which traverſes the box, but is not wormed in that manner in Fig. 51, where the outſide of the plate is hollowed a little around this hole, to make room for the flat head of this ſcrew, which will be ſpoken of hereafter.

The two plates now deſcribed are fixed in their proper places by means of two others (Fig. 55 and 56.) which laſt are of equal ſize with each other. D E (Fig. 50.) is the profile of Fig. 55, which is the back of the box; and A B (Fig. 50.) is the profile of Fig. 56, which is the front of the box repreſented at A (Fig. 48 and 49.)

The two tenons A and B (Fig. 55.) enter into the two mortiſes which are hid near G and H in Fig. 50. The two other tenons C and D (Fig. 55.) are expreſſed near G H in Fig. 50, and receive the mortiſes G and H of Fig. 51. In like manner the two tenons E and F of Fig. 56, enter into the mortiſes hidden near K and L in Fig. 50, where are marked the two other tenons, likewiſe ſeen at G and H in Fig. 56, which are to receive the mortiſes K and L of Fig. 51. The diſtance between the tenons of the ſame ſide of a plate, and conſequently between their mortiſes, is arbitrary; as is alſo the length of the tenons, which are pierced, in order to their being fixed very tightly by pins about the twelfth part of an inch thick. Theſe two plates (Fig. 55 and 56.) when rightly placed between the other two plates, ſhould be perpendicular to them, and parallel to each other, as well as to the lateral edges of thoſe other plates, and the diſtance between them, from inſide to inſide, ſhould be four inches. The upper edges of the four plates, when they are put together, ſhould be horizontally level; by which means the bottom of the two largeſt plates will reach lower down than the ſmaller. Theſe two ſmaller plates (Fig. 55 and 56.) are ſhaped like a parallelogram two inches and a third wide, and four inches and thirteen twenty-fourths long. This breadth anſwers exactly to the ſpace between the lines *i x* and *o s*, (Fig. 39.) and between the lines *f g* and *h i*, (Fig. 49.)

The plate (Fig. 55.) which is ſeen in perſpective in Fig. 52, has, quite acroſs its inner ſurface, a ſolid plint

x L,

x L, which is of the ſame piece as the plate, and runs parallel to $f g$, (Fig. 52 and 55.) The bottom of this plint is flat, and its top is arched like a portion of a circle. Its thickneſs from i to n is nine twenty-fourths of an inch, and its projecture $i x$, (Fig. 52,) is ſuch that its edge x L meets the ſurface of the cellular cylinder, as in the profile d (Fig. 50.)

The uſe of this plint is to ſtrengthen the aſſemblage of the plates; for which purpoſe its ends x L, (Fig. 52.) ſhould join exactly to the larger plates: and it ſerves likewiſe to prevent the grains of corn from ſlipping down between the plate and the cellular cylinder.

To the top of the inſide of this plate is faſtened, by two ſcrews a and p (Fig. 52.) a plate of braſs one-twelfth of an inch thick. Its extent, a, p, d, b, is a rectangle parallelogram, of which the breadth $a p$, or $d b$, is the ſame as that of the plate to which it is faſtened; ſo that its edges $a b$ and $p d$ lie cloſe to the inſides of the two largeſt plates (Fig. 50 and 51.) The profile of this plate is ſeen at $a l b$, (Fig. 50.) where it is inclined from l to b, in ſuch manner that the whole length of its edge $b d$, (Fig. 52.) is almoſt cloſe to the ſurface of the cylinder, directly above its axis, as in the profile b, (Fig. 50.) But this plate muſt not quite touch the cylinder, becauſe it would then obſtruct its motion, or at leaſt occaſion a needleſs and detrimental friction. Its uſe is to hinder the corn which fills the ſpace F, from falling down into the ſpace M, and to make it paſs only under the piece $r q$ (which will ſoon be deſcribed) to drop from thence into three pipes, which begin near e, as will be ſeen hereafter.

The plate Fig. 56, (ſeen in perſpective in Fig. 53, with ſome pieces fixed to it) has, riſing upon its inner ſurface, four exactly ſimilar ſmall partitions, which are of a piece with the plate. Theſe four partitions $c p$, $d e$, $f g$, $h i$, (Fig. 56.) are ſeen in perſpective at $m s$, $o t$, $q v$, and $r x$, in Fig. 53. The top $r x$ of all theſe partitions is rounded like the quarter part of a circle, and the bottom $x v$ is flat, and at the ſame height as the axis of the cylinder, as may be ſeen in the profile e of one of theſe partitions (Fig. 50) The two outer partitions $c p$ and $h i$, (Fig. 56.) are at the edges of the plate, and the two others $d e$, $f g$, divide the ſpace between c and h into three equal parts. Theſe partitions are about a twelfth part of an inch in thickneſs, and their rounded part terminates in an edge, that the grains which may chance to fall upon it may not lodge there. The height $u r$, (Fig. 53.) or $i h$, (Fig. 56.) of all theſe partitions, is nine twenty-fourths of an inch. The lower ends $s w$, $t æ$, $v a$, $x u$, (Fig. 53) of all theſe partitions, are in a plane perpendicular to the plate, and parallel to the edges $b a$, $q r$, of this plate (Fig. 56.)

This plate has alſo upon its outer ſurface a ſmall cylinder, which is ſeen in profile at K, (Fig. 50) in front at A, (Fig. 49.) and in perſpective A, (Fig. 49.) and B, (Fig. 1, Plate X.) Its whole length is two-thirds of an inch, and its diameter is half an inch, excepting its ſhoulder at the plate, which is a little more. This cylinder is pierced lengthways with a female ſcrew, which goes through the plate perpendicularly to its ſurface, and through which paſſes a ſcrew C q, (Fig. 50.) five twenty-fourths of an inch in diameter, of which the end is ſeen at q, and the head at C. This head is alſo ſeen at B, (Fig. 1. Plate X.) The hole is ſeen at k (Fig. 56) in the inner ſurface of the plate. The center of this hole k is in the middle of the breadth of the plate, and at the diſtance of five twenty-fourths of an inch from its edge $a b$. This fixes the place of the ſcrew and of its cylinder; the only uſe of which laſt is, by its length to give the greater ſtability and firmneſs to the ſcrew which keeps the bin at a greater or leſs diſtance from the cellular cylinder.

Of the Bin and its Valves, Plate XIII.

The bin, which has ſix valves, is ſeen in profile at $q n$, (Fig. 50.) The outſide of this bin is ſeen in perſpective at $g h n$, (Fig. 53.) with the ends of the valves a, b, c, d, e, f, ſeparated from each other by partitions. It is ſuſpended in the box by the axis or ſcrew before-mentioned (Fig. 50 and 51.) which goes in at the hole n in the end (Fig. 51.) of the box, then paſſes through the hole n of the bin (Fig. 50 and 53.) runs quite through the length of the bin, and ſcrews into the female ſcrew in the plate (Fig. 50.) which, as was ſaid before, is directly oppoſite to the hole n in the plate (Fig. 51.) The head of this ſcrew, at n (Fig. 51.) lies even with the outer ſurface of this plate.

Fig. 57 repreſents in perſpective the bin alone and its partitions, all made of one piece, or plate of braſs. Fig. 58. repreſents geometrically the fore-part of the bin, which is here turned towards the ſeedſman. Fig. 60 repreſents its back. Fig. 62 its bottom. Fig. 59 one of its utmoſt ſides, or largeſt partitions, both of which are equal and alike. And Fig. 61 the ſide or profile of one of the ſmaller partitions, which are all equal and like to each other.

The whole length of the bin from outſide to outſide, that is to ſay, from a to c, and from b to d, (Fig. 58.) or from c to d, and from e to f, (Fig. 60.) is the ſame as the breadth of the inſide of the box, or of the ſpace between the lines $i x$ and $ó s$, (Fig. 39.) or $f g$ and $h i$, Fig. 49.) The bottom of the bin is a parallelogram i, k, d, b, (Fig. 58.) or a, b, d, c, (Fig. 60.) eleven twenty-fourths of an inch wide at $a c$ and $b d$. This bottom is of the ſame thickneſs as the largeſt partitions or ſides $a b$, $c d$, (Fig. 58.) and the five ſmaller partitions; that is to ſay, three twenty-fourths of an inch. Theſe partitions, both great and ſmall, are at equal diſtances from each other, and all their ſides are perpendicular to the bottom of the bin.

The whole length of the two largeſt partitions, (Fig. 59.) from b, to the pricked line $g d$, which is perpendicular to $a b$, is one inch and ſeventeen twenty-fourths. Their breadth at $a i$ and $b c$ is five-ninths of an inch. The line $c m$, parallel to $b a$, is eleven twenty-fourths of an inch long. The notch $l m$ is one-twelfth of an inch deep. The angle a, b, c, is of eighty-five degrees. The perpendicular diſtance from the center of the hole s, to the line $g d$, is a quarter of an inch; and the perpendicular diſtance from the ſame center to the line $a b$, is five-twelfths of an inch. The diameter of this hole is a full twelfth of an inch. The perpendicular diſtance from the center of the hole r, to the line $g d$, is very near, but not quite, one-ſixth part of an inch; and the perpendicular diſtance from this ſame center to the line $a b$, is five twenty-fourths of an inch. The diameter of this hole is one-ſixth of an inch. Theſe two main partitions, $a b$ and $c d$, (Fig. 58.) which have now been deſcribed in the account of Fig. 59, are exactly alike, and pierced

pierced in the ſame manner; ſo that if they could be laid flat together, inſide to inſide, their dimenſions and holes would tally perfectly.

It is through the hole *r*, (Fig. 59.) that the ſcrew or axis is paſſed which keeps the bin ſuſpended to the plates, and which was mentioned before. Theſe two holes *r r* are ſeen in Fig. 57, where their axis is indicated by two pricked lines. And it is through the hole *s*, (Fig. 59.) that the ſcrew or axis is paſſed which goes through the valves, next to be ſpoken of, and by which they are ſuſpended in the bin. Theſe two holes *s s* are ſeen in Fig. 57, with their axis, which is indicated by two pricked lines.

Fig. 61 repreſents the profile of the ſmall partitions. Its total height from *a b* to *c d*, is equal to the breadth *d b* of the bottom (Fig. 60.) as is ſhewn in Fig. 58. The ſhape and ſize of theſe ſmall partitions is exactly alike, and equal to that part of Fig. 59, which is included between the lines *e*, *f*, *b*, *c*; ſo that their edges would tally in all reſpects, if they were laid one upon the other. The line *c d*, (Fig. 61.) is perpendicular to *c a*.

The edge *m c*, (Fig. 59.) is a bevil, ſloped towards the inſide of the bin, as at *e f*, (Fig. 57.) and *a d*, (Fig. 62.) The like edge *z b*, (Fig. 57.) and *b f*, (Fig. 62.) is ſloped in the ſame manner. All the ſimilar edges *e b*, (Fig. 61.) of the ſmall partitions, which are included between the lines *e f* and *b d*, (Fig. 58.) are bevils on each ſide, and form as many acute edges, as is ſeen in Fig. 62, between the lines *a b* and *d f*. The diſtance between the lines *a b* and *g h*, is five-ninths of an inch.

Fig. 58 is repeated in Fig. 64, with only the addition of the ſix ſprings *a b*, *c d*, *e f*, *g h*, *i k*, *l m*, each of which is faſtened by a ſmall ſcrew, *a*, *c*, *e*, *g*, *i*, *l*, at one of their ends, next to the bottom of the bin, and in the middle of the interval between two partitions. The breadth of theſe ſprings is nearly equal to two-thirds of this interval, and their thickneſs is the ſame as that of a common ſpring of a watch, which is the ſtuff they are made of. Fig. 63 exhibits a front view of one of theſe ſprings. Their length and bending, when in a ſtate of reſt, is repreſented in the profile *e d*, (Fig. 65.) *b a*, (Fig. 66.) ſhews the profile of theſe ſprings in a ſtate of contraction.

Fig. 64 is repreſented in Fig. 67, with only the addition of the ſix valves *c d*, *e f*, *g h*, *ik*, *l m*, *n o*, ſeen in profile in Fig. 65 and 66. Each of theſe ſix valves is, at moſt, one-twelfth of an inch thick, and their total length, *a b*, (Fig. 65.) is one inch and thirteen twenty-fourths. The ſix valves, put together, weigh twenty penny-weights, or five-ſixths of an ounce. When put into their proper places (Fig. 67.) each of them covers one of the before-mentioned ſprings. The breadth of each of them is equal to the whole width of the interval between two partitions, between which they muſt only be able to move. They are all faſtened to the ſame axis *a b*, which, as was ſaid before, paſſes through the holes *s s*, (Fig. 57 and 59.) The diameter of this axis is a full twelfth part of an inch. One of its ends ſcrews at *a*, (Fig. 67.) into one of the aforeſaid holes *s*, and the other end, which has a flat head, is buried at *b*, in the other hole *s*; for which purpoſe the outſide of the plate is pared away a little, around this hole. One of theſe holes is ſeen at *p*, in Fig. 50 and 53. The valves are laid flat in Fig. 67, with their ſprings contracted, as in the profile (Fig. 66.) When the ſprings are at liberty, they puſh the valves out of the partitions, as far as is repreſented in the profile (Fig. 65.) But they are kept within partitions, by a cover *a b*, Fig. 69.) which is put into the notch *f m*, (Fig. 59.) and *e d*, (Fig. 61;) and, in ſhort, into all the notches, which are upon a level with each other, from *i e* to *f k*, (Fig. 58.)

Fig. 67 is repeated in Fig. 69, with only the addition of the cover, which is three quarters of an inch wide, as long as the whole breadth of the bin, and not quite a twelfth part of an inch thick. It is faſtened by two ſcrews *a* and *b*, which go into the upper edge of the large partitions, as appears in the profile (Fig. 66 and 70.) Fig. 70 repreſents one of the large partitions of the bin, with the end *c d* of its cover, and the head of one of the ſcrews which faſten it. Fig. 66 repreſents the profile of one of the ſmall partitions of a valve *e f*, of its ſpring *a b*, and of the cover *d c*. This figure ſhews alſo, that the end of the valve cloſes with the loweſt edge of the partition; as may be ſeen more diſtinctly at *d o*, (Fig. 67 and 69.)

Fig. 68 repreſents the back of theſe ſix valves faſtened to their axis.

The end of each valve, *d*, *f*, *h*, *k*, *m*, *o*, (Fig. 67.) is bent a little outward, as in Fig. 71, which is only a repetition of Fig. 62, with the addition of the ſprings of the valves, and their cover.

The whole bin, furniſhed with the ſix valves and their axis, the ſix ſprings and their ſcrews, and the cover and its two ſcrews, but not the axis or ſcrew which ſuſpends the bin in the box, weighs four ounces and a half.

The bin thus completed, and ſuſpended in the box, as was ſaid before in ſpeaking of Fig. 50 and 53, is again covered by a thin plate of braſs repreſented in perſpective at *i*, A, *k*, N, P, (Fig. 53.) and of which the profile is likewiſe ſeen at *i*, A, *s*, *k*, (Fig. 50.) This plate is bent at A P, (Fig. 53.) in ſuch manner that its bended part turns inward, over the upper edge of the front of the braſs-box; and its edge, which is ſeen in profile at A *i*, (Fig. 50 and 53.) and fully at *e n*, (Fig. 48 and 49.) is faſtened to the upper part of the outer ſurface of this plate of the box, by two ſcrews *e* and *n*, which go into the holes *l* and *m*, in Fig. 56. This plate, from its bending A P, (Fig. 53.) projects over into the box, inclining down to the bin, which it covers as low as N *k*, where the cover of the bin before-mentioned ends. This plate performs the office of a ſpring, and ſhould therefore be ſcrewed on very tight. It preſſes the bin againſt the end *q* of the ſcrew *q* C, (Fig. 50.) The breadth A P and *k* N of this plate, (Fig. 53.) is the ſame as the breadth of the inſide of the box; ſo that its two edges, A *k* and P N, lie cloſe to the inner ſurfaces of the two large plates, (Fig. 50 and 51.) which form the ends of the box.

Of the three Pipes of the Seed-Box, Plate XII. *and* XIII.

Fig. 72 repreſents a perſpective view of the three pipes, which are ſeen partly at B, D, E, Fig. 48 and 49, Plate XII. and at *a b*, Fig. 1, Plate X. They are made of plates of braſs, about a twelfth part of an inch thick, and are ſeparated from each other only by a ſimple

partition. Their front is ſeen in perſpective, and on the right hand ſide of the drill, in Fig. 72. Their back is ſhewn in perſpective, and on the right-hand ſide of the drill, in Fig. 53. Their front is repreſented geometrically in Fig. 49 and 73; and their back in Fig. 75. Fig. 74 repreſents geometrically, the ſide or profile of the middle pipe, which is inclined with the piece that faſtens it to the plate. The profile of the pipes on each ſide of this is indicated by pricked lines.

Theſe three pipes, (Fig. 72.) are ſet againſt the plate (Fig. 56.) in ſuch manner that the edges *a*, *b*, *c*, *d*, (Fig. 72.) are applied cloſe to it, and in the ſame order, at *i r*, *v g*, Fig. 56. The edges *g h*, *f e*, (Fig. 72.) are applied in like manner at *p q*, *s e*, (Fig. 56.) The line *b h*, (Fig. 72.) is ſet exactly even with *r q*, (Fig. 56.) By this means the anterior ſurfaces *b c k i*, and *f h l m*, of the two outer pipes, (Fig. 72.) exceed the bottom of the box, as at B D, (Fig. 48 and 49;) and the upper edges *a n*, *d o*, *e p*, *g q*, (Fig. 72.) join to the lower edges of the four partitions (Fig. 56.) at *i*, *g*, *e*, *p*, as is ſeen in perſpective in Fig. 53, at *x*, *u*, *v a*, *t æ*, and *s w*.

Theſe three pipes, which hold together, are faſtened to the plate by means of a ſingle braſs ſcutcheon A, (Fig. 72,) which is ſeen directly in front at H, (Fig. 49.) and at A, (Fig. 73.) Its fore-part and right-hand ſide are ſeen in perſpective at A in Fig. 72; and its fore part and left-hand ſide at H (Fig. 48.) Fig. 75 ſhews a full view of the back part of it at A; and the whole profile of it on the right-hand ſide, is ſeen at N *u* B L, (Fig. 50.) and at *b d l f*, (Fig. 74.) This ſcutcheon is bent at *d* and at *m*. Its breadth is the ſame as that of the middle pipe, which is the interval between the other two, as is ſeen in Fig. 48, 49, 72, 73, 75. Its part *b d*, (Fig. 74.) is ſoldered or riveted to the lower ſurface of the middle pipe: from thence it takes an horizontal direction from *d* to *m*, and then aſcends perpendicularly from *m* to *f*. This length *m d* is one inch, and the thickneſs of the ſcutcheon, throughout, is about a ſixth part of an inch, or ſomewhat leſs. The thickneſs of the plate, Fig. 56, of which the profile is here at *q l*, Fig. 74, is exactly embraced between the extremity *r i* of the pipe, and the ſcutcheon *f l*. The bottom *q r*, (Fig. 56.) of this plate, reſts upon the horizontal part *o l* of the ſcutcheon, (Fig. 74;) and this ſcutcheon is faſtened to the plate by a ſcrew *p g*, which goes into the hole *n*, (Fig. 56.) It is to be obſerved, that the line *r o*, (Fig. 74.) is equal to the edges *a b*, *c d*, *e f*, *g h*, (Fig. 72.) of which it expreſſes the profile; that its farther extent *o a*, (Fig 74.) is equal to the lines *q i*, *c k*, *f l*, *h m*, (Fig. 72.) of which it expreſſes the profile; and that the line *d l*, (Fig. 74.) is in the ſame horizontal plane as the line *b*, *h*, (Fig. 72.)

The angle *r*, *i*, *e*, (Fig. 74.) is of one hundred and twenty-ſix degrees; and the diſtance from *o* to *i* is one third of an inch. The outſide breadth of theſe three pipes, taken together, is the ſame as that of the plate; and each of them occupies a third part of that ſpace, as in Fig. 53, 46, 73 and 75. Each of them is ſquare. The length of the two outer pipes, from the line *b h*, (Fig. 72.) or from the bottom *q r*, of the plate, (Fig. 65.) to the line *i m*, (Fig. 72.) or *x o*, (Fig. 56.) is one inch and a twelfth: the length of the middle pipe, (Fig. 74.) from *i*, where it joins to the plate, to its other end *e*, is four inches and five twelfths.

Theſe three pipes are faſtened to the plate, as in F 53. The edges *x*, *z*, *v*, T, E, *t*, *l*, D, *s*, *y*, of th upper openings, are circular, that they may fit exact and fit cloſe to the circumference of the cylinder, wh is there indicated by pricked lines, and is ſhewn in F 50, by the line *t v f*, which expreſſes the profile of th edges, againſt which the cylinder rubs lightly when turns.

Manner of working the Seed-box, and of the Pieces whi it contains, Plate XIII.

The line or edge *g h* of the ſix valves, (Fig. 53,) mu be very near to the ſurface of the cellular cylinder, th not quite ſo cloſe as to occaſion a friction when the cy linder turns; and the lower end of each valve muſt an ſwer to a row of cavities; ſo that the part F of the ſeed box, (Fig. 50.) being filled with corn, and the cylinde turning from *b* to *r*, this laſt carries with it the grain that fall into the cavities which paſs under the edge o the correſponding valves: thoſe that fall from the tw valves *a* and *b*, (Fig. 53.) are dropped, by the cavities into the pipe G, in the ſpace between the pricked line *g s* and *b t*, and are conveyed to the back of the ſhar which is on the left hand ſide of the drill: thoſe that fall from the two next valves, *c* and *d*, are dropped between the pricked lines *b t* and *d v*, into the pipe H, and are conveyed to the back of the ſhare which is in the middle of the drill: and thoſe that fall from the two laſt valves, *e* and *f*, are dropped between the pricked lines *d v* and *h x*, into the pipe M, and are conveyed to the back of the ſhare which is on the right hand ſide of the drill.

If it happens that ſeveral grains preſs together at the ſame time, at the outlet of any one of the valves, ſo as to choak it, that valve immediately gives way, lets them paſs, and is inſtantly replaced as before, by means of its ſpring which puſhes it back. No grain is ever broken by the valves: ſo that if this accident does ſometimes happen to a few, it is not during the time of actually ſowing the ſeed, but only when the drill is turned, in order to begin another bout, or when the ſeedſman, inſtead of drawing the drill forward, drags it towards himſelf, and makes the cylinder turn backward.

By looſening the ſcrew C *q*, (Fig. 50.) which is at B in Fig. 1, the bin, before preſſed againſt this ſcrew by the ſpring or plate A *s k*, (Fig. 50.) is moved farther from the cylinder, the ſpace between the cylinder and the end of the valves is increaſed, and a greater quantity of corn then paſſes at a time. By turning the ſcrew C *q* farther in, the bin is puſhed nearer to the cylinder, and fewer ſeeds are dropped.

To know exactly how much the bin ſhould, at any time, be ſet nearer to, or farther from the cylinder, there is, at one of the ſides of the bin, a ſmall ſcrew, of which the head of *m* paſſes through a circular opening M N, (Fig. 51.) in the largeſt plate of the box, where it becomes a certain guide, by means of a few equal diviſions engraved and numbered at the edge of that opening. The center of the arch of this opening is the ſame as that of the hole *n*, upon which the bin moves.

Of the Hopper, Plate XIII.

Fig. 67. repreſents in perſpective the hopper which is ſeen at A in Fig. 1, and of which the bottom covers the

the top of the ſeed-box. D, (Fig. 76.) is the front, and A the right hand end of the hopper. The boards which form the ends A and B are three quarters of an inch thick; thoſe of the ſides D and C are ſeven twelfths of an inch thick; and the thickneſs of the cover is five twelfths of an inch. The ſides and ends, which are at right angles to each other, and to the bottom, are joined together by dove-tail tenons; and the bottom is joined to the ends A and B by tenons which go into mortiſes in theſe ends, as may be ſeen on the line *b g*. The four tenons G, H, E, F, enter into the mortiſes Q, R, S, T, in Fig. 24, of which the dimenſions have been given. Thoſe dimenſions fix the length *g e*, or *k d*, of the hopper (Fig. 76)

Its breadth from outſide to outſide, at *a k*, or *b g*, is ſeven inches; and its outſide depth *k g*, or *d e*, is eight inches and a half. The height of the legs of the hopper, from the line *h l*, where it reſts upon the upper ſurface of the table, to the line *b g*, which is the under ſurface of its bottom, is determined by the diſtance between the top of the ſeed-box and the top of the table: it is here eight inches and a ſixth. In the middle of the breadth of the two legs, are two openings, N and P, rounded at their top, to let though them the iron axis which bears the cellular cylinder, and keeps the ſeed-box ſteady under the hopper. Theſe two openings are ſeven inches high, and one inch and three quarters wide. The hopper is faſtened to the table by two hooks, one of which is ſeen entire at L N M, and part of the other at P Q. Each of them moves upon the rivet L, juſt above the opening of the foot, and is bent from thence to N to make room for the paſſage of the axis; after which it hooks into a ring M and Q, fixed upon the table, but not mentioned before.

Towards D is a ſquare opening, an inch and a half wide, cut immediately above the bottom, and through which the hopper may be emptied. This opening is ſhut by a ſmall plate of iron or braſs, which turns like a latch upon a ſcrew *n*, which faſtens it at that end, whilſt the other end *r* is ſlipped down to the ſmall piece of braſs or iron *v x*, which is faſtened to the box by a ſcrew at *x*, in ſuch manner, that the pricked part of the latch, near *r*, is covered by the end *v* of this laſt ſmall piece, which is bent for that purpoſe, ſo as not to lie quite cloſe to the box, and the edge *r q* of the farther part of the latch reſts upon the edge *x* of this ſmall piece.

Of the Fore-Carriage, Plate XIV.

Fig. 77 is a perſpective view of the fore carriage without its wheels. It is ſeen with its wheels in Fig. 1. Plate X. Fig. 80 repreſents a geometrical plan of the inſide of one of the wheels of the fore carriage, which is ſeen at *t* Fig. 1, Plate X. and Fig. 81, Plate XIV. repreſents a ſection of it. P and Q, (Fig. 77.) are the two fore-ends of the beams, to which the fore-carriage is faſtened by hooks and rings.

In Fig. 77, *a d*, and D E, are the two exactly ſimilar pieces which are ſeen at S *s* and V *r* in Fig. 1. Their length *a d*, (Fig. 77.) is two feet eight inches; their breadth *d* A, is two inches and two thirds, and their thickneſs is two inches. They are parallel to each other, and connected by two traverſes, *g*, *h*, *f*, *l*, of which the ends are tenons pinned into mortiſes in the pieces D E, *a d*. Theſe two traverſes are omitted in Fig. 1. Plate X. in order to render that drawing the more ſimple. The length of theſe traverſes, excluſive of their tenons, is two feet, their breadth is two inches and a quarter, and their thickneſs one inch. Theſe two traverſes are perpendicular to the two other pieces. Their diſtance from each other, between the fartheſt outſide edge *g h* of the one Fig. 77, and the fartheſt outſide edge *f l* of the other, is ſeven inches and a half. The edge *g h* is one foot ſix inches and a third diſtant from the two ends B and D.

F G is an axle-tree, of which the middle part *n s* is two inches and ſeven twelfths ſquare, and of which the upper angles are cut off as in the drawing. The ſquare ſhoulders of the two ends *s n*, from whence the ſpindles proceed, project a very little beyond the outſide of the pieces D E, and *a d*, in order that the nave of the wheels may not rub againſt theſe pieces. The ſpindles *s* G, *n* F, are eight inches and a third long, and one inch and five twelfths in diameter. This axle-tree is placed upon the pieces D E, *a d*, parallel to the traverſes *g h*, *f l*, in ſuch manner that the diſtance from the line *s n* to the ends E and A, is a foot and a half. This axle-tree is faſtened to the two pieces D E, *a d*, by two iron pins and nuts, *b q*, an inch and a ſixth ſquare, of which the ſcrew, which is ſeven twelfths of an inch in diameter, has a head an inch and a half in diameter, which lies cloſe to the under ſurface. This ſcrew is repreſented with its nut in Fig. 78. Upon this axle-tree are fixed two wooden pins, five or ſix inches long, and five tenths of an inch, or a whole inch in diameter. Theſe pins are perpendicular upon the upper ſurface of the axle-tree; the ſpace between them is four inches, and this ſpace is in the middle of the length of the axle-tree. This axle-tree is pierced perpendicularly between the two pins, to admit another pin, which will ſoon be ſpoken of.

The two wheels, which are placed at F and G, are exactly alike. Fig. 80 repreſents the inſide of one of theſe wheels, with a pully fixed round its nave, and faſtened to its ſpokes by four ſcrews, each of which goes through the pully and one of the ſpokes. This pully is ſeen in profile at *b d*, (Fig. 81.) with two of its ſcrews.

The total diameter, *g h*, of each wheel, excluſive of its iron hoop, is two feet and a half; that of the nave *p q* is four inches and one ſixth; that of the pully *b d* is one foot two inches and a ſixth; the thickneſs of the pully is an inch and one third; its groove, which is cut down ſquare, is two thirds of an inch wide, and two thirds or three quarters of an inch deep. The length *p r*, or *q s* of the nave, is ſix inches; the thickneſs of the wheel at *i n* is an inch and two thirds, and at *i b* two inches and a quarter. Of the four hooks R, H, T, K, (Fig. 77.) which ſerve, by means of two rings, to faſten the fore-carriage to the ends of the beams P Q, the two, H and K, are faſtened in the uſual way, by nailing them, at their flat end, upon the two pieces of the fore-carriage: but the other two, R and T, are ſhaped like a carpenter's ſquare, of which one end is ſcrewed upon the beam, in order to facilitate the putting on or taking off the ring. At T, this hook is placed in its proper ſituation for holding the ring: at R, it is turned the other way, that the ring may be taken off eaſily.

Of the Pieces which ſupport the Drill upon its Fore-carriage, Plate XIV.

Fig. 82 repreſents in perſpective a piece of wood which ſupports the drill upon its fore carriage, when there is occaſion to turn it in ſowing. This piece may be called the pole. It is ſeen at *x d* in Fig. 1, Plate X. Its end A, (Fig. 82.) enters into the two bridles or belts *g r h* and *a c b*, (Fig. 26,) which have been ſpoken of before, and of which one is ſeen near *d* in Fig. 1. Its other end *q r*, (Fig. 82.) reſts upon the axle-tree (Fig. 77.) between the two pins, as is expreſſed by pricked lines in Fig. 82, and as may be ſeen at *x* in Fig. 1.

The breadth *q r*, (Fig. 82.) of the lower ſurface of this piece is an inch and a quarter, throughout its whole length, to its end A; and its thickneſs throughout its whole length *q s* is an inch and a half. Its upper angles are taken off, from the end *q r* to *s*; but from *s* to A, this piece is ſhaped like the two bridles or belts into which it is to enter.

Its length from *q* to *s* is one foot ſeven inches and five-ſixths; and from *s* to *t*, it is two inches and ſeven-twelfths. At *t*, the thickneſs of a quarter of an inch is taken off from its under ſarface, as at *t v*; and from *v* to A, its lengths is five inches and five-twelfths. It is the length *s* A, that goes into the two belts or bridles *g r h*, and *a c b*, (Fig. 26, Plate XI.) and the notch or ſhoulder *t* is made in order to inſert a wedge whenever it is neceſſary to make the end *q r*, (Fig. 82.) reſt upon the middle of the axle-tree, in order to convey the drill the more eaſily to any diſtant part, without putting it upon its hind-carriage. This wedge ſaves the ſeedſman the trouble of holding up the handles of the drill ſo high as he would otherwiſe be obliged to do, to make the end *q r* of this piece (Fig. 82.) reſt upon the axle-tree. It is by the help of this piece, that the ſeedſman, when he comes to the end of each bout of the drill, is enabled very eaſily to turn it in order to begin another, by lifting the drill up by its handles; for as the end of this piece reſts upon the middle of the axle-tree, he makes the drill follow the fore-carriage, which is drawn by a horſe; and as the diſtance, in this caſe, is but five or ſix feet, there is no occaſion for his making uſe of the wedge. By this means the drill is turned conveniently, and without any loſs of time.

The lines A *v*, *t s*, are even; but *q s* is inclined at *t s*, and makes with it an angle *t s q* of 166 degrees. *s a* and *g n* are two ſquare pins, faſtened by tenons into the middle of the breadth of the under ſurface *r q s*, perpendicularly to the lower ſurface *t s*. The pin *s a* is placed near the bending *s*, and the diſtance between the edges or lines *s a* and *g n*, is fourteen inches and two thirds. The breadth *a o* and *n p* of theſe pins, is an inch and a quarter: their thickneſs is two thirds of an inch; the length of *s a* is three inches and a half, and that of *g n* five inches. This pin *g n* is reſted againſt the axle-tree F G of Fig. 77, and the other, *s a*, (Fig. 82.) is placed near the table of the drill. The uſe of theſe two pins is only to hinder this piece of wood from ſlipping out of the two belts before deſcribed.

Fig. 83 repreſents in perſpective the piece of wood which ſupports the drill upon its fore-carriage, when it is placed upon its hind-carriage, in order to be removed from one place to another. This piece neither is, nor can be, ſeen in Fig. 1, which repreſents the drill in the ſtate of actual ſowing, and without its hind-carriage. The end A, (Fig. 83.) goes into the belts *e f*, *g* (Fig. 21.) before deſcribed, like which it is ſhaped and the end B, (Fig. 83.) reſts upon the axle-tree (Fig. 77.) between the two pins. This part of the axle-tree is covered before and beneath by a ſlip or hook of iron B E C, (Fig. 83.) which is nailed under the end of the piece A B, as in Fig. 84. The axle-tree, the bar, and its hook, are traverſed by an iron pin, D E (Fig. 83.) and *d e* (Fig. 84.) which paſſes through the hole in the axle-tree, between the two pins, (Fig. 77.) The length of this piece, A B, (Fig. 83.) is three feet and four inches: its breadth is two inches and a half, and its thickneſs is one inch and a third. The pin F G which is ſuſpended here, is put into the ring or bridle L, (Fig. 22.) and goes through the hole immediately underneath it.

Of the Hind Carriage.

This hind-carriage is ſo ſimple that it would be needleſs to give a drawing of it. It conſiſts only of two common wheels, unſhod with iron, two feet eight or nine inches in diameter, ſet upon a very ſimple axle-tree, in the upper ſurface of which are two holes, into which are put the two pins before-mentioned, which are under the beams of the drill. One of them is ſeen at *f h*, (Fig. 3.) and likewiſe at △, (Fig. 1.) Plate X.

It is neceſſary to fix, by proper marks, the reſpective places of the ſeveral ſcrews and mortiſes of the whole machine, in order that when it is taken to pieces and put together again, none of theſe pieces may be miſplaced, or any of the helixes (or ſpiral lines) which the flat-headed ſcrews have formed in the wood, be ſpoiled.

It is better to make the teeth of the harrow bend a little more than thoſe before deſcribed, and repreſented in Fig. 5, Plate X. They ſhould bend ſo that the point *e* of the tooth may project about four inches beyond the pricked line *f*.

Figures 85 *and* 86, *Plate* XIV. *compared with Figures* 2 *and* 31, *Plate* X. *and* XII.

The mortiſe A, in Fig. 85, is the ſame as that which is marked Q in Fig. 2. But the end of each beam ſhould be made about two inches wider on the inſide, and a ſecond mortiſe B, (Fig. 85.) ſhould be cut through it, ſimilar and parallel to the former, and at the diſtance of five-ſixths of an inch, or an inch, from it, that the ſhare may be faſtened in the one or the other, according as it may be found proper to place the two fore-ſhares nearer to, or farther from each other, in order to ſow the rows cloſer than they would be by the ſituation of the mortiſes Q and R, (Fig. 2.) but then the pipes which anſwer to the back of theſe two ſhares ſhould be faſtened in the manner which will be explained hereafter.

The middle piece K L, (Fig. 2.) ſhould project beyond the table, from C to D, (Fig. 85.) about nine inches or a foot, and the belt or bridle L, (Fig. 2.) ſhould be ſuppreſſed. This ſame piece ſhould have, in its part E F, (Fig. 85.) nearly the ſame breadth as the end of the beams H, I; and two mortiſes, E F, inſtead of one, in which the ſhare, thicker than was ſaid before in its upper part, is to be faſtened by two tenons and a key

a key. The pipe which terminates behind this ſhare, inſtead of paſſing ſideways, as in Fig. 31, will go ſtraiter and more eaſily through the hole G, (Fig. 85.) which is ſeen at K, (Fig. 86) and from thence through the thickneſs of the ſhare, which will be pierced for this purpoſe from K to G. The ſole of this ſhare, from this hole to its bottom, will be of the ſame thickneſs as was mentioned before.

Figures 87 *and* 88, *Plate* XIV. *compared with Figures* 29 *and* 30, *Plate* XI.

The upper opening, *f d*, *h o*, (Fig. 29.) of the two foremoſt pipes ſhould be joined by a good hinge A. (Fig. 87.) well ſoldered to them, and of which the pin, ending with a ring at one end, may eaſily be taken out. By means of this hinge, theſe two pipes may be ſet cloſer together or farther aſunder, like the legs of a compaſs, and be fitted to the different ſituations of their ſhares. The faſtening of the lower end of theſe pipes will be nearly the ſame as was deſcribed in Fig 30; with this difference, that inſtead of bending the ſquare *k i g* of that figure only at *i*, upon its upper ſurface, and making its part *k i* run lengthways of the beam E F; here, (Fig. 88.) is twiſted as it were in the bending, in order that the part *s n* may lie acroſs this beam, and lengthways of the table. In this caſe, if the ſhare A be put into the mortiſe B, the parts *s n* muſt be ſlipped farther, till the hole *s* can be faſtened at *n*, by the thumb-ſcrew which is at *n*: and as this part, being held only by a ſingle ſcrew, might be apt to looſen and jog, a piece or ſlip of iron, *a v*, is permanently fixed at its edge, ſo as to keep it tight in either of its ſituations. The ſcrew *n* faſtens in a nut ſunk into the upper ſurface of the beam, where this nut is permanently fixed, and covered by the table. There ſhould likewiſe be two holes in the other part of the ſquare, towards *q*, to ſerve for the two different ſituations of the ſhare. The pipes of the ſhares are more eaſily made round, as is here repreſented, than ſquare, as was directed before.

Figure 89, *Plate* XIV. *compared with Figure* 35, *Plate* XI.

Inſtead of the ſmall grove *n*, (Fig. 35.) in the braſs cylinder, intended for introducing a little oil to that part, a more ſimple way will be to bore a purpendicular hole *p*, (Fig. 89.) through the head of the ſtandard, down to the ſpindle; and this hole may be covered by a ſmall plate A, made to turn upon a ſcrew or rivet.

Figures 90, 91, 92, 93, *and* 94, *Plate* XIV. *compared with Figures* 50, *and* 53, *Plate* XIII.

As the three pipes or funnels, G, H, M, (Fig. 53.) embrace at their upper opening only a ſmall part, *f*, *t*, (Fig. 30.) of the cellular cylinder, ſome grains may chance to be loſt on the ſide where this cylinder is not covered from *d* to *f*. To prevent this inconvenience, they may be made ſo as to embrace the whole lower ſemi-diameter *d f t*, of the cylinder in the manner repreſented in Fig. 90, 91, 92, 93, 94.

The firſt funnel, which is ſeen geometrically at A, B B, (Fig. 90.) is repreſented in perſpective, and of a ſmall ſize, in Fig. 93, where its correſponding parts are marked with the ſame letters *a*, *b b*. This is the funnel M of Fig. 53. The ſecond large funnel, of which a part appears at D, (Fig. 90.) is ſeen entire and in perſpective, in Fig. 92, where the ſame part is marked *d*. This is the funnel H of Fig. 53. Two ſcutcheons *g* and *p* are ſoldered to this funnel, and faſten it, by ſcrews, to the fore and hind inner ſurfaces of the box, as at P G, (Fig. 90.) The third funnel, which does not appear in Fig. 90, and which is like the firſt, is repreſented in Fig. 91. This is the funnel G of Fig. 53. Theſe three funnels are made ſeparately, of very thin plates of braſs, bent, and well ſoldered; and are afterwards firmly riveted to each other, ſide to ſide, as in the perſpective, (Fig. 94.) They are ſo tightly joined, that the ſcutcheons *g p*, (Fig. 92 and 93.) are alone ſufficient to hold them all in their proper places.

Figures 95 *and* 96, *Plate* XVI. *compared with Figures* 66, *Plate* XIII.

In the repreſentation of this part in Fig. 66, the valve *e f*, is actually cloſed by its ſpring *a b*, to the cover *d c*, and in this ſituation it is ſhut: but when the corn preſſes againſt this valve, and forces it into the ſituation *a b*, (Fig. 95.) a grain may jump ſo as to get between the valve and the cover, and thereby hinder the valve from cloſing again; ſo that more corn would continue to run out. To guard againſt this accident, each valve muſt have a ſmall tongue *p* immediately below the cover, and the cover muſt be bent in that place, to receive the tongue when the valves cloſe. Both of theſe are repreſented ſeparately in perſpective, in Fig. 96.

Figure 97, *Plate* XIV. *compared with Figures* 50 *and* 51, *Plate* XIII.

Inſtead of the index *m*, (Fig. 50.) and the graduated opening M N, (Fig. 51.) an eaſier and more ſimple way will be, to faſten the end A of a graduated limb or border of a circle, A B, (Fig 97.) to the bin, in ſuch a manner that its other end B may project through a hole in the front of the braſs-box. This will mark exactly the ſituation of the bin.

Figure 98 *compared with the Figures* 82, 85, *Plate* XIV. 21, 26, *Plate* XI.

When the middle piece is lengthened, as at C D, (Fig. 85.) there is no occaſion for the ring or bridle L, (Fig. 2.) and *f k*, (Fig. 26.) or for the pieces *s a* and *g n*, (Fig. 82.) and then the pole A. of this Fig. 82, will paſs through the belt A, (Fig. 98.) and through another belt B, which laſt goes round it and the piece D. This belt is fixed by two ſcrews under the piece B D. The pin C, which penetrates into the table, will complete the fixing of this pole. The hole K, (Fig. 85.) receives the pin F G, (Fig. 83.) which goes through the two pieces C D, (Fig. 85.) and A B, (Fig. 83.)

M. de Chateauvieux's *Inſtructions concerning the Manner of uſing* his DRILL-PLOUGH.

This drill is repreſented in Fig. 1. Plate X. with all its parts put together, in a ſtate fit for working. When the thongs which encompaſs the grooves of the pullies Q P of the axis in Fig. 1, and thoſe of the fore-carriage *u t*, are ſtretched properly, and the hopper is

filled with corn, a horſe is to be harneſſed to the ſpring-tree bar, and an intelligent men, who can walk a good pace, ſhould guide this horſe, which ſhould be a mild, tractable creature.

"The ſeedſman will hold the handles of the drill, in order to direct it: and he will warn the guide whenever he deviates from the ſtrait line in which he ought carefully to keep. He will alſo obſerve from time to time, whether the diſtribution of the ſeed is not ſtopped by ſome unexpected accident; for he can ſee the end of the pipes through which the grain ſhould drop; beſides which the corn makes a little noiſe in paſſing through the pipes, and he may eaſily hear it. The ſeedſman will take particular care that the thongs do not ſlip out of the grooves of the pullies; and if they do, he will replace them inſtantly: but this accident is very rare; nor, indeed, does it hardly ever happen, unleſs the thongs are new, and have not yet been ſufficiently ſtretched. It is proper to obſerve here, that we have tried hempen ropes, and ſmall iron chains: but thongs of leather are much better than any other thing.

"Care ſhould be taken, that the ſeed-corn be free from grit, dirt, or little ſtones; for either of theſe might damage the valves of the bin. If the corn has been ſteeped in lime water, as is the practice of ſome farmers, in hopes of preſerving their crops from ſmut, it muſt not be ſown till it is ſo dry that the grains will ſlip eaſily over one another.

"The ſeedſman will be particularly careful to repleniſh the hopper before it is quite empty.

"He will oil the ſpindles of the axis once or twice a day; obſerving that they require moſt frequent oiling when the drill works in dry ground, which ſends up a very fine duſt: and he muſt cleanſe the ſpindles and the pipes in which they turn, every morning, by rubbing off the old oil, and putting on new. He will alſo, from time to time, cleanſe the ſpindles of the axle-tree of the fore-carriage, and rub them with ſoap. If any rain happens to fall during the time of ſowing, he muſt wipe the drill very dry, as ſoon as he has got it home, and particularly about the axis, to prevent its ruſting. It is even highly proper to have a leather covering to put over the table and all the parts upon it, and likewiſe over the ſtandards, the axis, and the hopper. It is eaſy to conceive the proper cut of this covering.

"The prudent huſbandman ſhould always have with his drill, a ſmall box, containing a hammer, a pair of pincers, a turn-ſcrew, thongs, ropes, nails, iron rings and buckles, a little bottle of oil, and other ſuch like things, in order that, if any of them ſhould be wanted in the field, he may not loſe time by being obliged to ſend home for them.

"The ſeedſman will obſerve, when he is going to ſow, not to leave the wedge *t*, (Fig. 24, Plate XI.) under the pole, in order that the end *c*, (Fig. 1, Plate X.) may not preſs upon the axle-tree of the fore-carriage. The only uſe of the pole, at the time of ſowing, is to turn the drill when a ſecond bed is to be ſown after the firſt is finiſhed, and ſo of others. It is eaſy to conceive, that if this end of the pole ſhould make the drill reſt upon the axle-tree, it might often happen, that, by its being thereby too much ſubjected to the motions of the fore-carriage, the ſtones or clods which the wheels may meet with, would, by raiſing them higher than the general ſurface, throw the ſhares out of the ground, or leaſt occaſion the furrows to be ſhallower in thoſe pla things which ought by all means to be avoided.

"We have repreſented but one ſpring-tree bar, Fig. 1, becauſe we think a ſingle horſe may be uſ without any inconvenience, when the ground is not much loaded with wet: but if the land be too full water, two horſes muſt be put to the drill, which, that caſe, muſt have a double bar, the manner of ord ing which is too well known to need any deſcripti Each horſe will then go in a furrow, and they will poach the bed, as would be the caſe in wet land, if t drill was drawn by only one horſe, whoſe ſteps are d termined by the middle of the bed.

"For want of horſes, oxen may be uſed, and t ſowing may be performed equally well.

"It is proper to obſerve, that the quantity of ſe diſtributed by the drill is exactly the ſame, whether t horſes or oxen go faſt or ſlow. If, for example, one b is ſown in ten minutes, and twelve or fifteen minutes a employed to ſow another, of equal dimenſions, neith more or leſs ſeed will be dropped in one than in th other; becauſe the revolutions of the cylinder, (Fig. 39 are inva iably regulated by thoſe of the wheels of th fore-carriage, whoſe circumference, be it turned quic or ſlow, will always deſcribe a line of equal length, an the cylinder turns exactly with theſe wheels. The onl difference that can ariſe from the greater or leſs ſpeed o the horſe, is the gain or loſs of time: but the quantity of ſeed ſown will be conſtantly the ſame, ſo long as th drill remains ſet in the ſame manner.

"The greater or leſs goodneſs of the ſoil, its having been well or ill prepared for ſowing, its ſtate of dryneſs or humidity, and ſeveral other circumſtances which ſhould be carefully attended to, will oblige the huſbandman ſometimes to vary the quantity of ſeed. The drill is accordingly made to diſtribute more or leſs, by the means before-mentioned, of placing the bin nearer to, or farther from the cellular cylinder, by turning the ſcrew L, (Fig. 50, Plate XIII). By ſetting the bin farther off, a greater quantity of ſeed is dropped; and by bringing it nearer, a leſs proportion is ſown. It will be eaſy to find the proper diſtance at which to fix it, in order to its giving out exactly the deſired quantity of ſeed.

"Though this method affords a pretty wide latitude, it may ſometimes not be ſufficient. This is a caſe which will very ſeldom happen, and which we have not yet met with; but if it ſhould at any time take place, the drill may eaſily be made to diſtribute ſtill more or leſs ſeed, by changing the pullies of the axis, (Fig. 39, Plate XII.) for others of a larger or ſmaller diameter, which will either accelerate or retard the motion of the axis, in proportion to their ſize.

"We will ſuppoſe, for example, that the pullies are but of half the diameter of thoſe before deſcribed. It is evident that theſe ſmaller pullies will make the axis turn round twice, where it turned but once with the former, and that double the quantity of ſeed will conſequently be dropped on the ſame length of ground. By the ſame rule, pullies twice as large will turn the axis but half the number of times, and but half the quantity of ſeed will of courſe be let fall in the ſame ſpace. The proportion of the ſeed ſown may likewiſe be increaſed or diminiſhed, by

by a greater or leſs number of cavities in the cellular cylinder; and the changing of this cylinder is ſoon and eaſily performed: but, as was ſaid before, there will very ſeldom be any occaſion for theſe alterations.

"The furrows opened by the ſhares of the drill, and in which the ſeeds are depoſited, ſhould be of different depths, in different caſes; and this may be effected by means of the rings which faſten the drill to its fore-carriage at the hooks R H, T K, (Fig. 77, Plate XIV.) For general uſe, the diameter of about three inches, from inſide to inſide, will be ſufficient for theſe rings, and then the furrows are made about three or four inches deep. They will be opened deeper by uſing rings, about four inches in diameter; and it is immaterial whether they are round or oval. With ſmaller rings the furrows will be made ſhallower; and their depth may alſo be diminiſhed, by making the horſe draw with longer traces, or by uſing a lower horſe.

"If very ſhallow furrows are wanted, or only juſt the ſurface of the ground is intended to be opened, the wedge *t*, (Fig. 24,) muſt be put under the pole. In ſhort, a little practice will ſoon ſhew the huſbandman how to manage this drill in every reſpect, and make him thoroughly acquainted with all that is neceſſary to be known in regard to the diſtribution and proper covering of the ſeed, which laſt part is perfectly well performed by the teeth of the annexed harrow.

"If any thing ſhould ſtill ſeem obſcure to thoſe who have read attentively, and ſtudied the deſcription of each part of this drill, let them but ſet actually to work, and their ideas of it will ſoon be perfectly clear. Each part taken ſeparately, may be made with great eaſe: their ſizes, ſhapes, and proportions, are pointed out in ſuch manner, that no workman of common underſtanding can miſtake; and when the parts are conſtructed, there can be no difficulty in putting them together, if the foregoing directions are but obſered."

"*Deſcription of a Harneſs to yoke Oxen one before another,*" *Plate* XIV.

"The utility of being able to put oxen to this drill, in ſuch manner as to make them go one before another in the furrow, without treading upon the places which are to receive the ſeed, firſt put me upon contriving a harneſs proper for theſe cattle: for I was not ſatisfied with thoſe I had ſeen in different countries. Two of my teams of oxen, harneſſed in my new manner, have worked the whole year; ſeveral perſons have adopted the method; and I am more and more pleaſed with it. This harneſs is very ſimple, and very light, and does not ſubject the oxen to any irkſome confinement.

"Fig. 99 and 100, repreſent the whole of this harneſs, that is ſay, its plan and a view of it. Fig. 99 ſhews it to be compoſed of a yoke A, which the ox bears upon his head, and which is there faſtened to his horns by long thongs. The reſt of the harneſs is of leather. The piece B, is the principal part, and that by which the ox is to draw. It reſts againſt his neck, a little below the withers, and fits extremely cloſe to the neck when the ox draws. If it is made of double leather, there is no occaſion for the piece of leather D, which ſerves only to ſtrengthen it when it is ſingle. The thong C faſtens in the buckle Q R, which is fixed to the yoke by another thong. The uſe of theſe is to hinder the large piece of leather B, from riſing above the withers, when the ox toſſes his head, or raiſes his neck. Care ſhould be taken not to ſtretch the thong C too much, for the ox muſt not draw by it.

"The thong E E, with their buckles to lengthen or ſhorten them, ſerve to make the oxen draw by the yoke, by putting them through the large iron buckles F F, and the leather buckles G G, which muſt be nailed to the yoke. The length of theſe thongs is ſuited to the purpoſe for which they are intended.

"My traces are made of ropes, and I find them convenient. At one end of them is part of a leathern trace, about fifteen inches long, like the end of the harneſs of a coach horſe. This end is put through the large buckles F F, where it is faſtened by the tongue *a a*: ſo that the trace may eaſily be ſhortened or lengthened."

The beſt ſort of harneſs for oxen, is the ſame that is uſed for horſes. In this manner the oxen are enabled to exert their ſtrength to much more advantage, than in yokes and bows, as has deen proved by experience; and that two oxen can, in harneſs, perform as much work as three of the ſame ſtrength in yokes. They are not ſo ſpeedy as horſes, and therefore not ſo proper for harrowing, and other buſineſs that requires a quick motion: but for a hard ſteady draught, and in harneſs, will do their work as well as horſes, allowing them ſome more time.

DRILL-RAKE, an inſtrument invented by M. Vanduffel, for drilling peaſe, &c.

This inſtrument is chiefly calculated for light grounds, in ſmall incloſures, not exceeding four or five acres. It is a ſort of ſtrong plough rake, with four large teeth at *a a*, *b b*, (Plate XV. Fig. 1) a little incurvated, as repreſented in the figure. The diſtance from *a* to *a*, and *b* to *b*, is nine inches. The ſpace, or interval, between the two inner teeth, *a* and *b*, is three feet ſix inches, which is ſufficient room for the cultivator or hoe-plough to move in, if conducted with care, before the peaſe have branched much. To the piece of timber *c c*, forming the head of the rake, are fixed the handles *d*, and the beam *e*, to which the horſe is faſtened.

It is evident, that when this inſtrument is drawn over a piece of land made thoroughly fine, and the man who holds it bears upon the handles more or leſs, according to his diſcretion, four channels or ſmall furrows *f*, *g*, *h*, *i*, will be formed; that the diſtance between the furrows *h i*, and *f g*, will be nine inches: and that the interval *e*, or ſpace contained between the furrows *g*, *h*, will be three feet and a half. It is alſo evident, that theſe diſtances may be preſerved with great truth, provided the teeth *a*, *a*, return (when the ploughman comes back, after having ploughed one turn, or a bout, as they call it) in two of the channels formed before, marked *b*, *b*; ſo that though he cuts four drills at the firſt bout, yet, in effect, he only forms two drils each turn, becauſe there are always two drills to be paſſed over twice, or reploughed, being, in fact, not much more than guides, or marks of direction. Yet even this ſmall work of ſupererogation repays itſelf, becauſe it makes the drills more open, diſtinct, and clear.

If the firſt four channels, formed at one motion by this inſtrument, are ſtreight and true, all the lines in the field will partake of the ſame regularity. It will therefore

fore be proper to mark out this firſt trace of the drill-rake by exact meaſurement, fixing into the ground, at every diſtance of ten feet, little flat ſticks, labelled with paper; which being finiſhed, the reſt may be left to the ploughman.

When the ground-plot of an acre is thus formed into drills (which may be completed in four hours, by one ploughman, a horſe, and a boy to lead the horſe) you muſt ſend two or three women and children into the field, in order to ſprain the peaſe, or ſcatter them by a ſingle motion of the hand; at a certain diſtance one from another, into the channels. Uſe no harrow, which will be apt to draw the ſeeds out of the lines; but cover them with the flat part of the head of a hand-rake, and preſs them down gently.

The great excellence of this drill-rake conſiſts in its ſimplicity; for after the meaſurement of the parts is once laid down, the meaneſt carpenter and ſmith in England can either make or repair it; and if the firſt four lines formed by it are true, the reſt of the lines or rows muſt be geometrically exact, which is an elegance none can feel, but ſuch as take delight in correct huſbandry. *Eſſays in Huſbandry*, *Eſſay* II. *page* 212.

DRONE, the male bee, one that makes no honey. *See the article* BEES.

DROPSY, a diſeaſe incident to horſes, and generally called the water-farcy. *See* WATER-FARCY.

DROPWORT, the name of a perennial weed common in paſture lands, having winged leaves; the diviſions of which are all regular, and ſharply indented about the edges. The flowers are white, growing in a bunch like an umbel. Its roots are very remarkable, conſiſting of a bunch of knobs hanging upon threads: from whence it has the name of filipendula, and dropwort. The flowers have an agreeable ſmell.

DROUGHT, dry weather, want of rain. It alſo ſignifies thirſt, or want of drink.

DUB, a pool, or pond of water.

DUCK, the name of a well-known fowl, very neceſſary for the huſbandman's yard, as they require no charge in keeping; for they live on loſt corn, ſnails, &c. for which reaſon they are very proper for gardens. Once in the year they lay a great number of eggs, eſpecially a ſort of duck which turns up its bill more than the common kind. When they ſit they require no attendance except they have a little barley or offal corn near them, that they may not ſtraggle far from their neſts to chill their eggs. They are reckoned to be better hatched under a hen than a duck; becauſe while they are young the hen will not lead them ſo often into the water. Some reckon it very proper to cut off the feathers from their rumps; becauſe when their tails are wet, it often occaſions their drowning. As to the fattening of them, you may do it in three weeks time, by giving them any kind of corn or grain, and plenty of water. Ground malt, wet either with milk or water, is beſt. *Mortimer's Huſbandry*, *vol.* I. *page* 257.

DUN, a colour partaking of brown and black.

DUNG, the excrements of animals, putrefied vegetables, &c. uſed in improving land.

Dungs are intended either to repair the decay of exhauſted worn-out lands, or to cure the defects of other ſoils, which are as various in their qualities, as the dungs uſed to meliorate or reſtore them. Some lands are too cold, moiſt, and heavy; whilſt others are too light and dry. To anſwer this, ſome dungs are hot and light, as that of horſes, ſheep, pigeons, &c. Others again are fat and cooling, as that of oxen, cows, hogs &c. And as the remedies which are uſed muſt be contrary to the diſtempers they are to cure, ſo the dung of oxen, cows, and hogs, ſhould be applied to lean, dry light earths, to make them fatter and cloſer; and hot and dry dungs to cold, moiſt, and heavy lands.

Dung has two peculiar properties. The one is to fatten the earth, and render it more fruitful; and the other, to produce a certain ſenſible heat, capable of cauſing ſome conſiderable effect; which laſt is ſeldom found but in the dung of horſes and mules, while it is newly made, and a little moiſt.

Horſe-dung, the leaſt fat of any, is the moſt fiery, if taken freſh as it falls, and the moſt apt to excite a ſudden fermentation; for which reaſon it is then fit only for the hot-bed. When this heat is paſt, it may be ſpread on fields where we would have a rank graſs to ſpring: but it ſhould not by any means be admitted into the garden, or where we would wiſh to have good roots, unleſs the ground be very ſtiff, cold, or wet, and then too it ſhould be well rotted, leſt, inſtead of correcting the ſoil, it leaves couch, and other pernicious weeds, worſe than the diſeaſe itſelf; the ſeeds of hay, and of other plants, which the horſes eat, coming oftentimes entire from them: for thoſe vegetables which cattle chiefly eat commonly ſpring up from their dung; as long knot graſs from this beaſt; ſhort, clean, and ſweet paſture from ſheep and cows; the ſow-thiſtle from ſwine. Ground mucked with horſe-dung is always the moſt infected of any; and if it be not perfectly conſumed, it makes your roots grow forked, fills them with worms, and gives them an unpleaſing reliſh: but if laid on at the beginning of winter, and turned in at ſpring, it ſucceeds ſometimes with pulſe.

Horſe-dung is greatly improved by being mixed with its oppoſite, cow-dung, which is cold and fat; and this mixture is conſiderably meliorated if mixed with a proper earth, with mud, or with aſhes and urine. Cow-dung alone is the worſt of all dungs to endure wet, becauſe it is the moſt eaſily diſſolved. But either of theſe dungs, either ſingly, or mixed as above, ſhould not be uſed till it is old; nor ſhould it be laid abroad expoſed to the ſun and wind, as is the practice of ſeveral injudicious farmers, who let it lie ſpread on their field-lands during three or four of the ſummer months, till the ſun and air have exhauſted all its virtue: whereas, if it be laid in heaps, mixed with earth, and left in that ſtate till it be rotten, it will be the ſooner brought to a proper temper, will produce a ſweeter graſs when laid on paſture grounds, and will go much farther than in the common way when ſpread before the plough for corn, of which it will then greatly promote the growth.

Mr. Miller ſays he has frequently ſeen new horſe-dung buried as it came from the ſtable, in very cold, moiſt land, and always obſerved that the crops have ſucceeded better than where the ground was dreſſed with very rotten dung.

Sheeps-dung and deers dung are nearly of the ſame quality, and are generally eſteemed the beſt of all dungs for cold clays. Some recommend beating them into powder, and ſpreading them very thin over autumn or ſpring crops, about four or five buſhels to an acre, in the ſame manner as aſhes, malt-duſt, &c. are ſtrewed. But

But this light dreſſing does not laſt long. The moſt common way of conveying it upon the land is, by folding of the ſheep themſelves upon it, by which means their urine is ſaved as well as their dung, which ought to be turned in with the plough as ſoon as poſſible, that it may not lie expoſed to the heat of the ſun. In Northamptonſhire, they think it beſt to fold ſheep after July, and to fold them the lateſt upon dry land. In ſome parts of France, where they likewiſe fold their cows and oxen, the place of folding is changed twice every night. In Flanders, they houſe their ſheep at night in places ſpread with clean ſand, about five or ſix inches thick, which, being laid on freſh every night, is cleared out once a week. This mixture of ſand and dung makes an excellent dreſſing for ſtrong land; for the dung and urine of the ſheep is a very rich manure. M. Quintinie thinks it the greateſt promoter of fruitfulneſs in all ſorts of ground. This method of folding ſheep in a covered fold, and of mixing their dung with earth, ſand, &c. according to the nature of the ſoil it is intended for, is likewiſe, very properly, recommended by Mr. Mortimer; who adds, that he has known vaſt crops of rye upon barren lands that have been old warrens, well dunged by rabbits; and large oak and aſh upon the ſame, though the ſoil was very ſhallow.

Next to ſheeps-dung, the preference is generally given to that of ſwine, one load of which will go as far as two loads of other dung. The laying it on too thick may perhaps have occaſioned the old miſtaken notion of its breeding more weeds than any other dung: for all dungs will make weeds ſhoot up; whether they contain within themſelves ſeeds of thoſe plants, not ſo thoroughly digeſted by the animal as to be deprived of their vegetative power, as may ſometimes be the caſe, or by the additional fertility which they communicate to the earth. This dung is beſt when carried from the ſtye directly to the field, where it is a rich manure both for corn and graſs, eſpecially the latter, and for almoſt any ſort of land. Hot ſands and gravel are particularly benefited by it; and it is reckoned a very great fertilizer of fruit-trees. Many good huſbandmen prefer this dung before moſt ordinary ſorts of manure, and to take great care not only to have their hog-yards well paled and paved with pebble, or other ſtones, or with chalk, which is much the beſt; but alſo to increaſe the quantity of the dung as much as they can, by throwing into the ſtye all the ſtraw, fruit, roots, beans, plants, weeds, &c. which are the refuſe of the garden, with the offals of the kitchen, and every kind of traſh; all which is not only very good for the hogs, themſelves, but increaſes their dung to ſuch a degree, that ten or twelve ſwine have yielded ſixty or eighty loads of excellent manure in a year. Some notable farmers will make their hog yard produce them an annual profit of twenty or thirty pounds. Mr. Worlidge thinks this the beſt of dungs to prevent or cure the canker in trees; and Mr. Mortimer eſteems it beſt for manure, when mixed with horſe-dung; for which reaſon he adviſes placing the hog-ſty as near the horſe dunghill as can conveniently be. The farmers in Staffordſhire frequently ſow on poor light ſhallow land, a ſmall white pea, which they never reap, but turn in as many hogs as they think the crop will fatten, and let them lie upon it day and night. The dung and urine of theſe animal enrich the land ſo much, that it ſoon acquires a thick ſward, and continues to be good grazing ground for ſeveral years.

In this light, of reaping a double advantage from the manuring of land, the author of the new Syſtem of Agriculture adviſes huſbandmen to ſow ten or fifteen acres of their ground with turnip-ſeed, a little before they ſow clover, which he thinks, is beſt done in September: then, towards the beginning of March, to take the beſt opportunity to buy three hundred ſows, all ſuch as will farrow in about a month. Let little ſties, formed of boughs and reeds, be made for them in the moſt convenient parts of the clover ground, either in the corners, or under the hedges of theſe fields; and let the ſows be kept up, and fed daily with the turnips which were ſowed the autumn before. At firſt, it will be neceſſary to take the trouble of boiling them, tops and all, and of giving them in the troughs with the water not yet cold: they may afterwards be only ſcalded; and in a week or ten days the ſwine will eat them raw, with the greateſt greedineſs and pleaſure. In the beginning, or towards the middle of April, theſe ſows will farrow: after which they muſt not be fed with turnips any longer, than till the clover is pretty high, when they and their pigs may be turned in among it. It is impoſſible for one who had not ſeen it, to imagine how eagerly the ſwine will graze on clover, which increaſes their milk to ſuch a degree, that the pigs ſhoot forward at a double rate; and as they leave off ſucking, they too take to feeding on the clover, by which they proſper ſo faſt, that by the end of October, every pig will fetch twenty or five and twenty ſhillings, in any market. The treading of great cattle is apt to break the ſtalk of clover graſs, and they ſpoil, by trampling it down, a much greater quantity than they eat: but ſwine are never hurtful this way; and if there be any fear of their rooting up the ground, that may be eaſily prevented by a ring in their noſes; though our author ſays, he never knew a hog break up an inch of clover. They graze upon it with more pleaſure than they could root.

Human ordure is a very fat and hot manure, full of fertilizing ſalts, and therefore extremely proper for all cold ſour ſoils, eſpecially if it be mixed with other dung, ſtraw, or earth, to give it a fermentation, and render it convenient for carriage. Some do not like to uſe it on account of its bad ſmell; and others imagine, that it gives a fetid taſte to plants; but in this they ſeem to carry their delicacy rather too far. It is uſed with great ſucceſs in many parts of France, all over Flanders, and, I believe, not leſs profitably round about London. Mr. Bradley ſays, it is kept in pits, made on purpoſe, in foreign countries, till it be one, two, three, or four years old: that of four years old is accounted the beſt; that of three years tolerable; but the others not ſo fit for uſe; and that the perſons concerned in theſe pits pay great regard to the place from whence they have it, preferring that which comes from towns where the moſt fleſh is eaten, as the ſtrongeſt and richeſt manure. It certainly ſhould not be laid on too new, nor in too great quantities, becauſe it is of a very hot nature; but when that heat is tempered by age, putrefaction, and a due mixture with other ſoils, it becomes a rich and excellent manure. Perhaps it may owe great part of this richneſs to the urine with which it is mixed; for tho' human urine be deſtructive to vegetables, whilſt it is new, by reaſon of its burning ſal-ammoniacal

moniacal ſpirit, as Glauber terms it, yet, as in many other moiſt things, ſubject to putrefaction, time will correct that defect, digeſt the urine, take off its fiery quality, and ſo alter its nature, as to render it an extraordinary fertilizer of every kind of ſoil. Columella certifies, that old urine is excellent for the roots of trees. Mr. Hartlib commends the Dutch for preſerving the urine of cows as carefully as they do the dung, to enrich their lands, and inſtances a woman he knew near Canterbury, who ſaved, in a pail, all the urine ſhe could; and when the pail was full, ſprinkled it on her meadow, the graſs of which looked yellow at firſt, but afterwards grew ſurpriſingly. Similar to this is what Mr. Bradley relates, as of his own knowledge. Human urine was thrown into a little pit conſtantly every day, for three or four years. Two years after, ſome earth was taken out of this pit, and mixed with twice as much other earth, to fill up a hollow place in a graſs walk. The turf which was laid upon this ſpot, grew ſo largely and vigorouſly, beſides being much greener than the reſt, that, by the beſt computation he could make, its graſs, in a month's time was above four times as much in quantity as that of any other ſpot of the ſame ſize, tho' the whole walk was laid on very rich ground. The author of the Engliſh Improver is therefore very right in ſaying, that human urine is of great worth, and will fatten land more than is generally imagined by our farmers, whom he adviſes to take all opportunities of preſerving this, and every ſort of urine for their ground, as carefully as is done in Holland.

The dung of all poultry is of a very hot nature, full of volatile ſalts, and therefore extremely proper for cold lands, being light of carriage, and a little of it going a great way. It is moſt commonly uſed for diſtant grounds, where it is ſprinkled on wheat or barley, after they are come up, or upon the latter at the time of ſowing. Mr. Mortimer thinks forty buſhels ſufficient for an acre. It is uſed to moſt advantage when dried and powdered, and is very efficacious in keeping froſt out of the earth. Its effects are ſudden, but they do not laſt long. Hens dung is very rich, tho' not ſo hot as pigeons dung, nor is it ſo eaſy to ſow, becauſe it hangs more together, neither can it be ſo eaſily collected. The opinion that gooſe dung is rather hurtful than beneficial to corn or graſs, is an ancient error, as is proved by Mr. Worlidge, who ſays, he was credibly informed, that a flock of geeſe having made a track acroſs a field of wheat during the winter, and nibbed the corn clear from the ground in their daily paſſage in ſuch a manner, that the wheat upon it proved the next year much finer than any other part of the field. He alſo mentioned a field which had been given to the town of Sutton, in Northamptonſhire, for feeding geeſe, whoſe dung rendered it one of the richeſt paſtures he ever ſaw, inſomuch, that all ſorts of cattle fed on it very greedily; nor could he hear from any of the inhabitants, that ſo much as one beaſt received the leaſt injury from it. He adds, that his own horſes, kept in a piece of paſture on which geeſe lay very much, eat the graſs bareſt where the fowls had dunged moſt, and that he never found it do them any hurt, except making them too fat.

Perhaps the reaſon why the dung of geeſe has been ſaid to occaſion barrenneſs, flowed from obſervations where it had been laid too thick; for being of a hot fiery nature, it will, if laid on in too large quantities, deſtroy the graſs; but if ſpread thin in the winter, it will prove a very rich and valuable manure, eſpecially mixed with cooling earth, and left for ſome time to putrefy.

DUNG-HILLS, heaps of dung collected in the yard and other places, belonging to a farm.

They are made-up of the dung of different animals, of different kinds of ſtraw, and other vegetable ſubſtances; and they have frequently different animal ſubſtances in their compoſitions.

Compoſt, or compound dung-hills, are a colection of different matters, as earth, mixed with dung from an ordinary dunghill, lime and other manure.

Some perſons make dung hills of this kind, and are of opinion, that the dung and other manures with which they are compounded, are thereby made to enrich a greater quantity of land, than if not mixed with earth; and beſides, do not produce the bad effects which ſometimes are produced by dung, when taken directly from a dung-hill, and laid upon land.

It will not be amiſs that we enquire into the advantages of this kind of dung-hill, which will be a means not only of recommending them, but alſo of pointing out the moſt proper method of conſtructing them.

The firſt thing to be enquired into, is the advantage ariſing from the mixing lime, marle, or other manures, with the earth and dung. Lime, as it is a diſſolver of all vegetable and animal ſubſtances, when mixed with dung, will help to diſſolve it; and as it communicates an abſorbent power to earth, will enable the earth with which it is mixed to attract the vegetable food in greater plenty from the air. But in order to make it produce theſe effects, it is neceſſary to mixt it with dung and earth; for if the lime is laid in a kind of ſtratum above the dung, and below the earth, it will abſorb the water that falls upon the dung-hill, and thereby will prevent the dung from receiving a ſufficient quantity of water to make it putrefy; and will alſo occaſion ſuch a heat as to burn the dung, and render it uſeleſs; and beſides, can have but little influence in diſſolving the dung, and communicating to the earth its abſorbent quality. If the lime is laid above the earth, and expoſed to the air, it will be attended with the ſame conſequences: it will abſorb the water; and tho' it will attract the vegetable food from the air, yet will be of no more uſe for this end, than if ſpread upon as much land as the ſurface of the dung-hill extends to.

The ſame thing may be ſaid of marle, if uſed inſtead lime; but if marle is uſed inſtead of earth, it is probable that the compoſt will become very rich, as the marle has a very ſtrong abſorbent quality, and would be greatly expoſed to the influence of the air. A much ſmaller quantity than is uſed in the ordinary way, it is probable, would be found ſufficient, and its effects would be ſooner diſcovered. If this is tried, it will be neceſſary to carry the dung to the marle-pit, and there form the dung-hill; for marle is ſo heavy a body, that it would be too expenſive to carry it firſt to the dung-hill, and then to the field.

The advantage of mixing dung with the earth is next to be conſidered. This, it is probable, is the principal advantage of the compound dung-hills, and that the advantages ariſing from lime are but trifling. They are often made without lime, and their effects, it is ſaid, are equally good.

Dung, in the ordinary dung-hills, has its vegetable food

food ſometimes waſhed away by rain, when it falls in large quantities. Now this is prevented by the earth in the compound dung-hill, which abſorbs the water, and all the vegetable food which it carries from the dung.

In the ordinary dung-hills, the dung on the ſurface, it is generally ſuppoſed, loſes a part of its vegetable food, which is exhaled by the ſun, or carried off by the wind. This is prevented, by covering the dung with earth in the compound dung-hill.

But it is probable, that the compound dung-hill receives its principal advantage from the earth being expoſed to the influence of the air; and if this be true, the more abſorbent that the earth is which is uſed, and the larger that the ſurface of the dung-hill is, in proportion to its bulk, and the quantity of dung contained, it will be the richer.

This directs us to the proper method of conſtructing it, to make it long and narrow, with as many diviſions in it as can be made conveniently; for thereby a larger ſurface is expoſed in the ſame quantity, and the more vegetable food acquired.

It is proper to obſerve further, that earth ſhould always be in the bottom of the dung-hill, to receive any of the juices of the dung which the rain may carry downward; that the dung ſhould be immediately covered with earth, to prevent the juices from being exhaled, or carried off; and that the earth ſhould be expoſed for a conſiderable time, before any more dung is laid on, that ſo it may receive all the benefit from the air which it is capable of, before it is covered.

This kind of dung-hills is made with leaſt expence upon the field for which the dung is intended. The headridges are commonly high raiſed, by the turning of the ploughs upon them, and contain the richeſt earth in the field. Theſe are very proper places for the dung-hills. The earth is at hand, and can eaſily be thrown upon the dung.

Thoſe that treat of dung-hills of this kind commonly recommend earth as oppoſite as poſſible to the nature of the ſoil upon which the dung is to be laid. They recommend clay for a light ſoil, and light earth for a clay ſoil. But theſe the farmer cannot always cammand; and though he can, will frequently find it very expenſive to carry them. It is probable, that there is not ſo much in adapting the earth of the dung-hill to the kind of ſoil, as perſons, at firſt ſight, are apt to imagine. It is certain, that there cannot be ſo much in it, as to anſwer the expence of fetching the earth. It is true, that, in many farms, there are different ſoils, and therefore the dung may be carried to a ſoil different from the ſoil of the field for which it is intended; there the dung-hill may be formed, and from thence carried to the field; but ſtill this is an additional trouble and expence; and therefore this method is not to be followed, till, upon a comparative trial, the advantages are found to do more than anſwer the expence.

It is a practice in ſome parts of Scotland, to lay clay upon clay land. This practice, it is ſaid, ſucceeds very well, which makes it probable, that it is not very material what kind of earth is uſed for the compound dung-hill, provided it is of the abſorbent kind; and, therefore, the farmer need not be anxious about getting earth different from his ſoil, but may make his compound dung-hill of the earth of the field which he intends to manure.

Dung, and other manures, are very important articles in farming: but though they are univerſally uſed, the manner of their operation upon land, whereby it acquires a greater degree of fertility, is but imperfectly known. It is, however, generally agreed, that they ferment in the ſoil, whereby it is opened and pulverized. Manures are of different qualities, which adapt them to different ſorts of land; but by mixing them together, as in compoſts, they are correctives of each other, and by that means become a more general manure, than any one of them can be ſingly; and their jarring qualities ſeems to be a means of prolonging their fermentation in the earth, which is one of the acknowledged benefits of manure.

In regard to mixing and preparing compoſts, it is frequently recommended, and commonly practiſed by farmers, to place the ſeveral materials in layers, ſix or eight inches, and ſometimes a foot thick: but when they laid ſo thick, eſpecially clay, or ſtrong earths, the fermentation in the compoſt is ſeldom ſtrong enough to penetrate ſuch thick layers of ſtrong cloſe earth: and if it does not, when the compoſt heap is turned, theſe layers come out whole, as laid in; they receive but little benefit by the fermentation, and require almoſt as much labour to break and mix them as they would have done at firſt. It is therefore much the beſt way to break the ſtrong earth, and other materials, at firſt, and to employ ſeveral labourers to throw them upon the compoſt heap in ſuch manner as to mix them well at firſt. By this method a fermentation quickly commences, the whole is intimately mixed and incorporated; ſo that much leſs turning than common is neceſſary, and the compoſt is ready for uſe in a much ſhorter time. It comes out of the heap in ſuch a condition as farmers deſire to have it, that is, it is dry and crumbly, and fit to ſpread equally upon the land. And if the owner finds the compoſt too dry in the heap, he may make holes with a pole, from the top to near the bottom of it; which holes being repeatedly filled with the running of a dunghill, or other liquid manure, it will ſpread and penetrate through the whole body of the compoſt, renew the fermentation, and improve the quality of the manure.

With reſpect to the quality of the earth to be uſed for compoſts, where ſeveral ſorts can be had at nearly the ſame expence, there is little doubt to be made that ſome are preferable to others. All writers on agriculture, antient and modern, agree in recommending the ſuperinductions to be of a different quality from the land to be improved; to lay ſand and light earths upon clays and ſtrong land, and the contrary; and, as experience has ſhewn this to be the moſt beneficial way of improving land, there is little room to doubt of the propriety of obſerving the ſame method, in making choice of ſome earths, preferably to others, to mix in compoſts, ſuitably to the kinds of land to be manured. The dung, and other putreſcent parts in ſuch compoſitions, are diſſolved and loſt in a ſhort time: but the earths, conſiſting of hard ſolid parts, remain, and become a part of the ſoil.

Farmers, eſpecially if they live in countries that do not abound in cattle, may be apt to aſk, where they are to get ſufficient quantities of dung neceſſary for carrying the practice of agriculture ſtill nearer to perfection? M. de Tourbilly anſwers this queſtion, by pointing out the following method of making an artificial manure.

Before the winter ſets in, ſays he, that is about the

middle of November at fartheſt, huſbandmen ſhould cleanſe all the yards, and out-lets belonging to the farm-houſe; lay them ſmooth, and, if neceſſary, dig away a little of their ſurface, till it is about a foot lower than the floor of their buildings; then if they have any common or waſte land, let them bring from thence fern, thiſtles, and other coarſe weeds, cut down in full ſap, at which time they are beſt, or occaſionally as they are wanted, and lay a bed of them, about two inches thick, upon the places thus prepared. If weeds cannot be got, coarſe wheat or rye ſtraw may be uſed in their ſtead, in beds about half as thick. A layer of earth, about ſix inches deep, ſhould be ſpread upon this bed of weeds, or ſtraw. Earth of a quality proper for the improvement of the ſoil intended to be manured is undoubtedly the beſt; though any earth, which in this caſe the farmer will dig as near to the houſe as he conveniently can, is preferable to the miſtaken practice of paring off the upper ſoil, or turf, of the neareſt common or waſte land, to mix with the artificial manure: for when poor ground has loſt its ſurface or ſward, it long remains a barren ſpot, before a new ſoil, capable of affording root and nouriſhment for graſs, can be formed upon it. If no proper earth lies nearer at hand, the farmer may take off the ſurface of any part of his ploughed ground which lies too high, and is not at too great a diſtance. But, as much as poſſible, he ſhould adapt the earth mixed with this manure to the nature of the land for which it is intended.

"This bed of litter and earth ſhould be let lie about a fortnight, during which all ſweepings and filth of the kitchen and houſe ſhould be thrown upon it, that nothing may be loſt, which can be converted into manure. The wetneſs of the ſeaſon, and the paſſing of men, cattle, and carriages, over this bed, will greatly contribute to rot it; to complete which, let the farmer turn in all his cattle of every kind, and drive them backward and forward over it, after rain has fallen. This will ſoon render it a kind of coarſe mud mixed with litter, which may be cleared away at the end of another fortnight. If it be too liquid, as it often is in rainy ſeaſons, it ſhould be laid up in little heaps, upon the ſame place, till it be drained. Let it then be carried to a ſufficiently capacious hole, or pit, dug for the purpoſe in or near a corner of the farm-yard. This pit muſt be in a dry place; for no manure ſhould ever be laid in water, which would waſh away its unctuous parts, deſtroy its heat, diſſolve its ſalts, and even leſſen its bulk conſiderably, if it run off elſewhere. One load of ſtable and other dung ſhould be mixed with every two loads of this artificial compoſt, as it is laid in the pit. The next day another bed of litter and earth may be ſpread in the yard, &c. as before; and, being managed in the ſame manner, will be fit for carrying to the dung-pit in about another fortnight. Thus two ſupplies of this artificial dung may be had every month, during the whole winter and part of the ſpring.

"This work will not be expenſive: every body, even women and children may be employed at it, and it is done at a time of the year when labourers are leaſt wanted in the field. It may be continued in the ſummer: though the beds do not rot near ſo ſoon in dry weather; two or three months being ſometimes requiſite then to bring them to a proper ſtate, in the above method. However, this may be conſiderably haſtened, and much improved, by bringing cattle to lie upon them in the night, unleſs they are in folds. The earth and other ſubſtances of this manure will be greatly enriched by their dung and urine, before it is carried to the ſtercorary.

"As this laſt made dung will not be ſufficiently rotted by the next ſowing ſeaſon, the beſt way is to lay it in a ſeparate pit, to mellow, for the enſuing year: and it will be ſtill better, if kept two years. The other dung, made in a wetter ſeaſon, and more thoroughly putrefied at firſt, ſhould remain about ſix months in the pit to ripen; and be wetted now and then in dry weather. During this time, it heats, ferments, and acquires an excellent quality. It may be made to ſuit any ſoil, and agrees with many lands better than pure dung taken from the ſtall or ſtable, than which it is milder, leſs fiery, and more laſting. Farmers who have not a large yard belonging to their houſe, may make this compoſt in any other place that beſt ſuits their convenience; and the poorer ſort of peaſants may do the ſame. By mixing with it a third part of other dung, they triple their quantity of manure." *Memoirs ſur les Defrichemens, p.* 78.

This eaſy and profitable method of making artificial dung is likewiſe recommended by the ingenious author of the Diſſertation on Agriculture, publiſhed in the Memoirs of the truly laudable Society eſtabliſhed at Berne, for the Improvement of rural Œconomy.

"There are, ſays he, two ways of meliorating land. One of them may be called natural, and the other artificial. The former conſiſts in a well proportioned mixture of two or three different kinds of earth, the reſult of which is a new ſort, more favourable to vegetation; and the latter in dung.

"Dung conſiſts of animal or vegetable ſubſtances, either actually putrefied, or in a ſtate of putrefaction. It operates two ways upon the earth: firſt, by conveying nouriſhment to the plants which grow in it, as the air and water alſo do; and ſecondly, by opening its pores and ſeparating its parts, by a kind of fermentation, till at laſt it is itſelf converted into a kind of fine black mould.

"The only way to have plenty of this uſeful matter, without much expence, is by a mixture of ſtraw or litter with the excrements of animals. Manure may be obtained from every part of animals or vegetables; but a quantity ſufficient for a large extent of ground would coſt too much. I therefore ſhall not here ſpeak of ſaw-duſt, tanner's bark, aſhes, ſoot, linen or woollen rags, ſhavings of horn, &c. of which quantities can be had only in the neighbourhood of populous towns; but ſhall content myſelf with pointing out the means of increaſing dung in countries diſtant from great cities.

"Agriculture affords an ample field, and very abundant matter, for the moſt uſeful of all experiments. Nothing would contribute more effectually to its improvement, nay, to the reducing of it to fixed and certain rules, than for proper perſons to try upon different pieces of ground, of ſimilar ſize and ſoil, ſome of the principal methods pointed out by the moſt intelligent in this art, and compare the iſſue of their trials, and the ſeveral incidents attending them, during a courſe of years. This is particularly wanted in order to determine the effects, and the quantity moſt proper to be uſed, of different manures. To this end, two or three fields for experiment

experiment might be ſet apart, to be cultivated exactly according to a well choſen and well digeſted plan. An exact account ſhould alſo be kept of every occurrence, diſburſement, and produce. Regularity is the ſoul of all buſineſs. Such journals, properly methodized, would give us a clear inſight into rural œconomy, and ſet order, aſſiduity, and frugality in ſo advantageous a light, that every one would be forced to acknowledge them to be the ſource of riches, and as ſuch would be induced to practiſe them." *Tome* II. *part* III. *page* 651.

Another way, and often leſs expenſive, of providing manure is, inſtead of fallowing and reſting the land, at certain intervals of time, to ſow it thick with the ſeeds of the moſt ſucculent plants, ſuch as peaſe, tares, buck-wheat, &c. theſe ploughed into the land, when in full ſap, make an excellent dreſſing to it, equal to dung, and make it fit to yield good crops of wheat. Red clover is alſo excellent for this purpoſe, ſown with barley or oats in the ſpring. It will yield a good mowing crop, and afterwards a crop fit to be ploughed in, as a dreſſing for a crop of wheat to ſucceed.

DURZ'D, or *dorz'd out*, an epithet, applied in the northern counties to corn beaten out of the ears by the wind turning it in the field, or other accidents.

DWARF-OAK, the name of a ſhrub common in many parts of North America, where it is planted for making Hedges and fences. It grows very faſt, and becomes ſo thick by cutting with ſheers, that hardly a bird or mouſe can creep through it when in full perfection. The acorns are ſown in rows or drills, where the hedge is propoſed to be made, which admits of being made of a conſiderable height. Such a fence as this would be a ſcreen from the winds in winter, as well as a ſecurity to the incloſure, and therefore a hedge of this kind would be very uſeful here: and the plant would, perhaps, on further examination, be found capable of being ſerviceable in ſome other ways. *Muſeum Ruſticum*, *vol.* VI. *p.* 293.

DYER'S-Weed. *See the article* WELD.

E.

EAR — ELM

EADDISH, or *Eddiſh*, roughings, or graſs growing among the ſtubble, after the corn is cut.

EARING, or *Aring*, ploughing, tilling, cultivating.

EARNING, cheeſe-rennet.

EARTH, the ground, conſiſting of different modifications of terrene matter.

The earth, which generally preſents itſelf firſt to the eye, is no particular kind of ſoil, but, uſually, a mixture of the ſoil underneath, with every adventitious ſubſtance, either purpoſely brought to, or accidentally lodged upon it. From theſe cauſes, this ſuperficial earth, commonly called mould, grows and increaſes yearly in depth; oftentimes to ſuch a degree, as to form even conſiderable eminences, eſpecially where there has been a fall of woods and trees, ſuch as birch and beech, which, not being of a conſtitution to remain long in the ground without rotting, as fir, oak, elm, and ſome other timber will do, are pretty ſoon reduced into mould as ſoft and tender as that in which they were ſown or planted.

This ſurface-earth, and alſo the natural under-turf earth, to the depth of about a foot, is generally the beſt and ſweeteſt, being enriched with all that the air, dews, ſhowers, and celeſtial influences can contribute thereto: for that earth is beſt, and it is the ſame with water, which is moſt expoſed to the influences of the ſun and air. The fatneſs of the under-turf earth, drawn up to the ſurface by the kindly warmth of the ſun, ſpends but little of its vigour in the graſs and tender verdure which it produces, provided no rank weeds be permitted to grow and perfect their ſeeds; but maintain its natural force, and is therefore, of all uncultivated moulds, the moſt grateful to the huſbandman.

As the reſt of the ſubjacent earths approach this in virtue, ſo are they to be valued. Of theſe there are ſeveral kinds, diſtinguiſhable by their ſeveral conſtitutions. The beſt of them is black, fat, and at the ſame time porous, light, and ſufficiently tenacious, without any mixture of ſand. It riſes in pretty large pieces, and falls into duſt, of its own accord, after a ſhort expoſure to the air; but without crumbling altogether into duſt, which is the defect of a leſs perfect ſort.

This excellent black mould is fit for almoſt any thing, without much manure. The farmer is not always ſo happy as to meet with it: or if there be a ſmall depth of it, other leſs fertile ſoils lie underneath, ſuch as clay, gravel, ſand, &c. which require different treatment, according to their various qualities. Theſe ſoils often appear on the ſurface; and may be ſaid to be almoſt barren, till brought by art to anſwer the purpoſes of the huſbandman. In clays and ſtiff ſoils, the component particles have too cloſe an adheſion to admit the roots of plants with the eaſe requiſite for them properly to ſeek their food: and, on the other hand, ſand, and ſoils of a light nature, are too looſe to give the proper ſtability to plants, or to retain the mixture neceſſary to convey their nouriſhment into them. It will therefore be right, firſt, to ſhew how theſe extremes may moſt properly be corrected, and then point out the means of keeping the ſuperficial mould in conſtant heart, to uſe the language of farmers.

EARTH-BOARD, that part of a plough which turns over the earth. *See the article* PLOUGH.

EAVES, the edges of the roof that over-hang the walls of a building.

EDDER, the ſmall ſhoots of aſh, hazle, oak, &c. uſed for binding the tops of hedges.

EDDISH, the ſame with eaddiſh. *See* EADDISH.

EDGE, the extremety of a border.

EDGE-GROWN, come up uneven, not ripening all together.

EDIFICE, a fabric, a building.

EFT, a newt, or evet.

ELBOW, a name given by horſemen to the hind-part of the fore-leg, pointing towards the briſket.

ELDER, fuel for fire.

ELDER, the udder.

ELDER, is alſo the name of a well-known tree, and is often uſed in making fences, which may be done by taking elder-ſticks, or truncheons, ten or twelve feet long, and ſticking them in the bank ſloping both ways, ſo as to form a kind of chequer work. By this means a fence may be ſooner raiſed than by any other, as the elder is a very quick grower. The wood, when large, is very uſeful for turners and mathematical inſtrument-makers, being nearly equal to the beſt box, and for many uſes ſurpaſſig it. *Mortimer's Huſbandry, vol. I. page 7.*

ELM, the name of a tree too well-known to need any deſcription, being common in almoſt every part of England.

Elms are very proper to be planted in hedge-rows, upon the borders of fields, where they will thrive much better than when planted in a wood, or cloſe plantation, nor will their ſhade be very injurious to whatever grows under them; but when theſe trees are tranſplanted out upon banks after this manner, the banks ſhould be well wrought and cleared from all other roots, otherwiſe the plants, being taken from a better ſoil, will not make much

much progreſs in theſe places. About Michaelmas will be a good time for this work, for the reaſons before aſſigned; but when they are planted, there ſhould be ſome ſtakes fixed in by them, to which they ſhould be faſtened, to prevent their being diſplaced by the winds; and part of their heads ſhould be taken off, before they are planted, which will alſo be of uſe in preventing their being eaſily overturned by winds; but by no means ſhould their leading ſhoots be ſtopped, nor their branches too cloſely cut off; for if there are not ſome ſhoots left on to draw and attract the ſap, they will be in danger of miſcarrying.

Theſe trees are alſo proper to plant at a diſtance from a garden or building, to break the violence of winds, for which purpoſe there is not any tree more uſeful; for they may be trained up in form of an hedge, keeping them cut every year, which will cauſe them to grow very cloſe and handſome, to the height of forty or fifty feet, and be a great protection againſt the fury of winds: but they ſhould not be planted too near a garden, where fruit-trees, or other plants, are placed; becauſe the roots of the elm run ſuperficially near the top of the ground to a great diſtance, and will intermix with the roots of other trees, and deprive them of nouriſhment.—Nor ſhould they be planted near gravel or graſs-walks, which are deſigned to be well kept, becauſe the roots will run into them, and ſend forth ſuckers in great plenty; which will deface the walks, and render them unſightly.

But, for large gardens, where ſhade is required, there is ſcarce any tree ſo proper for that purpoſe, being eaſy to remove, when grown to a conſiderable ſize; ſo that a perſon who is willing to have his plantations for ſhade, in a ſhort time, may procure trees of one foot circumference in their trunk, which will be in no danger of ſucceeding, provided they are removed with care. And theſe will take root, and grow again, almoſt as well as young plants, which is what few other ſorts of trees will do; but then they ſhould be ſuch trees as have been thus regularly trained up in a nurſery, and have good roots, and not ſuch as are taken out of hedge-rows, as is by ſome practiſed, which ſeldom riſe with any tolerable roots, and conſequently often miſcarry; and this has been the occaſion of ſo many plantations of theſe trees failing; for although ſome of them may live a few years, yet few of them are of long duration, and they rarely increaſe much in their ſtems, but frequently grow hollow, their heart decaying firſt; ſo that they are ſupported only by their bark or ſhell, for a few years, and the firſt ſevere winter, or very dry ſummer, they are generally deſtroyed.

In planting of theſe trees, great care ſhould be taken not to bury their roots too deep; which is very injurious to them, eſpecially if they are planted on a moiſt loam or clay; in which caſe, if the clay is near the ſurface, it will be the beſt way to raiſe the ground in an hill, where each tree is to be planted, which will advance their roots above the ſurface of the ground, ſo that they will not be in danger of rotting in winter with moiſture.

When theſe trees are propagated by ſuckers taken from the foot of old trees, they are commonly laid into the ground very cloſe in beds, where, in dry weather, they may be frequently watered, to encourage their putting out roots. In theſe beds they are left two years; by which time, thoſe that live will be well rooted, though a great many of them generally die; then they ſhould be tranſplanted into the nurſery.

There are ſome who raiſe the witch elm from ſeeds, which it generally produces in great plenty, and are ripe in April. Theſe ſhould be ſown upon a bed of freſh loamy earth, and gently covered; in dry weather they ſhould be watered, and if the bed is ſhaded from the violent heat of the ſun, it will be of great ſervice to the ſeeds, for I always obſerve the plants to come up better in the ſhade, than when expoſed to the ſun. When the plants come up, they ſhould be carefully cleared from weeds; and after they have ſtood two years in the ſeed-bed, they will be fit to plant out into the nurſery.

Sometimes the common Engliſh elm will produce ſeed; but it is not ſo conſtantly fruitful as the witch elm which ſeldom fails to produce great quantities, when they have arrived to due maturity; which ſeeds will fall to the ground, and when they light upon a ſpot which is not diſturbed, the plants will come up in great plenty.

The timber of the common Engliſh elm is generally preferred to the reſt; though that of the witch elm is often as good, and is the largeſt tree, when planted on a kindly ſoil; but the Dutch elm affords the worſt timber, and never will grow to the ſtature of either of the other ſorts; ſo that this ſhould not be cultivated for the timber; therefore the beſt way to be ſure of the kinds which a perſon would chuſe to propagate, is to have a nurſery of ſtools, in order to furniſh layers; for when they are grubbed up from hedge-rows, there will often be many ſorts intermixed, eſpecially if the people who go about to gather them, furniſh them; becauſe they take them indifferently wherever they can procure them; ſo that when they are planted out thus blended together, there will be a conſiderable difference in their growths, which will deface the plantation. *Miller's Gard. Dict.*

ERSH, the ſtubble after corn is cut.

ERGOT, a ſort of ſtub, like a piece of ſoft horn, placed behind and below the paſtern joint.

ESCALLION. *See the article* SCALLION.

ESPARCET, the ſame with ſaintfoin. *See the article* SAINTFOIN.

ESSE, a provincial word uſed in Cheſhire, to ſignify aſhes.

ETCH, the ſame with erſh. *See* ERSH.

EVERLASTING-PEA, or broad leaved chichling vetch, a perennial plant, which grows naturally in ſome parts of England, is eaſily cultivated, and the root yields every year a great burden of excellent provender.

Theſe are great inducements for encouraging the cultivation of this plant, which ſeems adapted to any ſoil.

"I ſowed three years ago, ſays a writer in the Muſeum Ruſticum, a rood of land, light, and but poor in quality, with this ſeed: this work was done early in the ſpring, the land being prepared as for barley.

"I ſowed it not in the broad-caſt way, as I ſhould have found much more difficulty to keep down the weeds; but I cauſed a ſlight furrow to be drawn the length of the land with a light plow; and when the ſeed was thinly ſprained, or rather dropped into this, another was drawn at a foot diſtance in which the ſeed was dropped in like manner.

"An interval, or fallow ſpace, was then left at leaſt two feet wide; then two more rows of the vetches, till the whole land was ſown. I muſt obſerve, that I covered

the ſeed by means of a light harrow with wooden tines, drawn backward and forward acroſs the land.

"When the plants came up, I had them well hoed, to clear the ground of weeds; and when they grew a little ſtrong, they were ſet out with the hoe to about a foot diſtance in the rows, that they might have room to ſpread and branch.

"The firſt year they yielded no great quantity of fodder, but they have ſince made me ample amends.

"The ſecond ſpring they came up very ſtrong and vigorous, branching out much; and when I turned a couple of horſes in to feed, they were very fond of it, eating it very greedily, tho' they were taken out of a good natural upland paſture.

"This laſt ſummer the land was almoſt entirely covered, and it yielded a great deal of ſeed indeed; for experiment ſake I cauſed a few rods to be mowed juſt before it flowered, and it made good hay, ſweet, without being ſticky.

"Before I conclude, give me leave to obſerve, that when I had cut a few rods of the everlaſting pea, to make into hay, a ſmall quantity of it was, by accident, ſpread thin upon the ground, ſo as to receive the full action of the ſun's rays: this was in a manner ſpoiled, becoming quite dry, inſipid, and brittle, and almoſt all the leaves dropping off; but the remaining part which was dried either in ſmall cocks or thick ſwarths, made excellent hay. I am, however, perſuaded that the laſt method is by much the beſt." *Muſeum Ruſticum, vol.* I. *p.* 468.

EWE, the female ſheep. *See the article* SHEEP.

Mr. Ellis in his Treatiſe on Sheep, has given us the following ſecret, which he poſſitively aſſerts will make ewes take ram at any time of the year. "Separate, ſays he, ſix or more of your ewes from the flock, and give to each half a pint of ſtrong ale, or the ſame quantity of good October, mellow, ſilky beer, and not that which is ſharp by ſtaleneſs; and for giving it in the eaſieſt and ſafeſt manner, you may run the ale or beer through a funnel into the ewe's mouth; and when the ewes have been all thus ſerved, put them into a proper place, not too large, nor too narrow, that the ewes may be confined with one or more rams, that have been before a little better kept than ordinary for this purpoſe. Out of ſix ewes, that I have known to take ram in this manner, not one of them has failed proving with lamb. By the above method and the aſſiſtance of a ſufficient number of hands, an hundred ewes may be thus doſed with ſtrong drink, and if rams enough are provided, they will all preſently take ram." *Ellis on Sheep, p.* 297.

EXERCISE, a proper agitation given to an animal body, in order to produce ſalutary effects.

Exerciſe duly given to horſes that are well fed, is not only the beſt means of all others to prevent ill habits, but to preſerve them in a perfect ſtate of health: for exerciſe converts the food into good and wholeſome nouriſhment, it promotes the circulation of the blood, and all the glandular diſcharges, ſo as greatly to enliven the body, and to make way for freſh ſupplies of aliment. It invigorates the ſpirits, gives ſtrength and firmneſs to the muſcles and ſinews, and enables a horſe to endure labour. And when exerciſe is given abroad, in an open free air, it adds greatly to a horſe's vigour, and prevents any diſpoſition to putrid coheſions in the blood, which a cloſe ſtagnated air often produces, and this eſpecially when horſes are young, and their appetites ſtrong; for indeed when horſes grow old, their appetites are more moderate, and reſt is oftentimes more agreeable to them than labour. Nevertheleſs, exerciſe is more or leſs, abſolutely neceſſary for all horſes, young or old: for we may obſerve, even old horſes, when they lie much ſtill, though they are not apt, as young horſes, to turn directly ſick, and fall into fevers: yet as their blood grows poor, and languid with age, they become ſubject to many infirmities, as ſwellings of their ſheath and bellies, with other dropſical ſimptoms, and ſometimes to obſtinate eruptions on their ſkins, which exerciſe in a proper degree often prevents.

Horſes, by their natural activity, are every way ſuited to exerciſe and labour, and in that reſpect are more uſeful than any other of the brute creatures; only it depends on us, how they are to be treated, both for their own preſervation, and our benefit; and their food ought always to be proportioned according to their exerciſe. But the time and manner of a horſe's exerciſe is alſo to be regarded, for if he happens either to be worked at an unſeaſonable time, or beyond his ſtrength, it will be more injurious to him than if he had not been worked at all. Therefore this general caution is always needful, viz. never to ride a horſe hard, or put him upon any violent exerciſe when he hath been newly fed, and has his belly full of meat or water; but ſhould be moved out at firſt gently, and he will naturally mend his pace, as his food and water begins to aſſuage, when his rider may urge him on to further ſpeed, as his buſineſs may require.

I need not tell any one, that when a horſe is hot with riding, or any other ſharp laborious exerciſe, he ſhould be cooled by degrees, this being known to almoſt every ſtable boy, from cuſtom and uſe, though it is often neglected through ignorance or idleneſs, or done with little judgment. And, therefore, when a man has travelled hard upon a journey, or when horſes have been driven hard in a coach or chaiſe, it is not ſufficient, after they come to their baiting place, or to the end of their day's journey, to walk them about in hand for half an hour or more, which is uſually done, but their pace ſhould alſo be ſlackened for a mile or two before they come in, and after that, ſhould alſo be walked ſome time in hand, that they may cool gradually before they are brought into the ſtable, with a thin cloth laid over each, if they have been uſed to it. This is the ſafeſt way with young horſes, that have been kept well, and have worked but little. And when ſuch horſes come late to the end of their day's journey, or when the weather is ſo bad, that they cannot be walked about in hand, they ſhould then be well rubbed all over their bodies and limbs, till they are quite cool, without taking off their harneſs and ſaddles, and then cloathed; for when all the ſmalleſt blood veſſels are replete and full, as they muſt unavoidably be in all ſtrong, and eſpecially in long continued exerciſe, and the blood extremely heated, and running like a torrent, any ſudden chill or damp will produce ſtoppages and obſtructions, where the veſſels are the moſt minute and ſmall, or wherever there is the greateſt weakneſs and relaxation, ſometimes inwardly in the lungs, ſometimes in the liver and kidneys, and ſometimes in the ſtomach and guts, and other membranous parts; and this is uſually followed with inward pain, and inflammation, or with great dulneſs and heavineſs, which, in the end, often produce many untoward diſorders; or if the limbs happen to be weak and relaxed, the blood and juices will ſoon drop down and ſtagnate there, ſo as to produce ſwellings, and ſometimes ulcerations, that are troubleſome enough to remove,

remove, eſpecially in thoſe that have been little accuſtomed to ſuch kind of labour; for habit and uſe, in continued exerciſe, alters the caſe very much, becauſe that ſtrengthens and invigorates the nerves and ſinews, as we obſerve in ſome hackney or job horſes, which are ſo ſeaſoned to their work, that ſcarce any thing can hurt them. Indeed ſome of the job horſes, that we ſee endure ſo much labour, are naturally ſtrong and very hardy, and have at firſt been carefully managed by their owners, who are not able to bear the loſs of cattle, as gentlemen or men of fortune; and, therefore, we ſee them generally, both begin and end their work with great coolneſs, and when they chance to meet with horſes that they find unable to go through their hard work, they uſually make their buſineſs only a mere play, that they may not looſe their fleſh, until they can diſpoſe of them to the beſt advantage. Another neceſſary caution for the preſervation of our horſes, is never to feed them too ſoon, after they have been heated with exerciſe. *Gibſon's Farriery, vol.* I. *page* 182.

EXPERIMENT, a trial of any kind; an eſſay made in order to diſcover an uncertain, or unknown effect.

For the ſeveral experiments made on wheat, barley, &c. *ſee the proper articles* WHEAT, BARLEY, &c.

EYE, the organ of ſight in an animal body; or that which repreſents objects to the mind.

The goodneſs or badneſs of the eyes of horſes is a thing wherein the beſt judges are ſometimes miſtaken; for moſt people regard the clearneſs and tranſparency of the eye, which indeed ought to be conſidered: but it is worth obſerving, that horſes, before they are ſix years old, have not that tranſparency in their eyes which they arrive at afterwards, becauſe while they are young and growing, their juices are viſcid and balſamic; ſo that their eyes look thicker or clearer, in proportion as their blood and juices happen to be more or leſs in a good ſtate. The ſame may be obſerved in all horſes that have colds, when the veſſels of the eyes are full: the eyes at that time look thick, and ſometimes inflamed, and a blow on the eye, or a bite will have the ſame effect, when there is not the leaſt danger of blindneſs.

It is not, therefore, always the clearneſs of the eye that denotes its goodneſs, but a man is alſo to form his judgment from other indications, particularly from the form and manner of the eye, which includes not only the body of the eye, but the eye-lids, eye-brows, and all the parts belonging to it. Many good eyed horſes have a heavineſs in their countenance, with a lowering brow, yet great numbers of this aſpect gõ blind with cataracts when they are about ſeven year old, or between ſeven or eight, and ſometimes later. Theſe are the moſt ſuſpicious where there is a bunch or fullneſs between the upper eye-lid and the eye-brow, with a fullneſs round the under eye-lid; ſo that the eye appears as if it was invironed in a ring. Such horſes are often fleſhy about the head and jaws, which, upon every cold, or rather ſlight accident, expoſes them to defluxions in their eyes.

When the eye is extremely flat or ſunk within its orbit, it is always a bad ſign, even though there be no defluxion or humour upon it; a ſmall pig-eye is none of the beſt, nor a large goggling eye. The one often periſhes for want of nouriſhment, occaſioned by ſome defect in the nerves or the arteries that ſupply it with blood; the other by being too much expoſed to accidents, and by having too great ſupplies of nouriſhment.

That eye is almoſt always weak which is of a longiſh oval figure, eſpecially when the two corners are narrow, like the ſhape of an almond. When the coat or membrane, that riſes from the under part of the eye happens to be large and thick, ſo as to preſs the eye-ball, and the caruncle or kernel on the inward corner next the noſe is ſpongy and moiſt, though there is ſometimes a remedy for this defect, yet ſuch horſes in the end generally go blind.

When the eyes are bad, the muſcles or movers of the eyes are generally weak: ſo if the eye looks dead and lifeleſs, the beſt way of trial is to hold up the horſe's head in the ſame manner as when a drench is to be given, which will draw the eye upward; and if it remains there fixed and immoveable, or has a languid motion, it is a pretty ſure ſign the eye is bad. And this trial will, for the moſt part, hold good whether the eye be moiſt or dry.

Some regard the colour of the eye, which, however, is different according to the difference of colour in horſes; and indeed we are ſo far to regard the colour, that if the iris or circle that ſurrounds the pupil or ſight of the eye be diſtinct, and of a pale variegated cinnamon colour, it always denotes a good eye. For the iris is always moſt diſtinct, where the humours of the eyes are moſt clear and pellucid; and thoſe horſes have the beſt eyes, which in colour reſemble the eyes of a ſheep or a goat; but few horſes arrive to that perfection of colour and tranſparency, till they are at leaſt ſix years old or upwards. On the other hand, if the iris or circle round the pupil be of a dark muddy colour, and does not appear diſtinct and variegated, till one approaches near the eye, and if the narrow ſky-coloured verge, which we obſerve more or leſs in moſt horſes on the outſide of the iris, happens to be of a milky hue, it is no good ſign. Nevertheleſs, wall-eyed horſes have, for the moſt part, good eyes.

Some, in examining the eyes, have a regard to the colour of the horſe, which I take to be no ſure way of judging; for as there are good horſes of all colours, ſo there are good eyed horſes of all colours. The grey, eſpecially the pigeon or dove-coloured grey, are the moſt ſuſpected; alſo the iron-grey, and the dun, &c. But I think I may ſay from experience, that whatever colour is the moſt common among the horſes, ſo as to exceed in number, abounds moſt with bad eyes: and I have obſerved as many bad eyed horſes among the black coach breed as any other.

Moſt people, in examining a horſe's eyes, lead him under a gate-way, or ſome ſhade, that they may ſee perfectly the colour and tranſparency of the eye: but the beſt way is to obſerve his countenance when he comes firſt out of a dark ſtable into a ſtrong light; for if he has any weakneſs in his eyes, he will wrinkle his brow, and look upwards to receive more light; and if the pupil at the ſame time be large, it is a bad ſign; and therefore the beſt way is to look to a horſe's eyes firſt in the ſhade, to obſerve the dimenſions of the pupil, and if that leſſens upon his coming out into a ſtrong light, it it almoſt an infallible ſign that the eye is good.

Some ſuſpect all horſes that ſtartle to have bad eyes; indeed many bad eyed horſes are apt to ſtartle: but a horſe that ſtarts and looks upwards, lifting his feet high when he moves, as if afraid to touch the ground, ſuch is more likely to have bad eyes than one that ſtartles; for many horſes ſtartle merely out of fear, and I imagine not a few from ſome defect in viſion, viz. from ſeeing objects in-

indiſtinctly at ſome diſtance, in all which caſes the eyes may be ſtrong and durable, though many fancy them to be weak. But if a horſe frequently ſtartles when no object is before him that might cauſe him to ſtartle, we may then ſuſpect this eyes to be but indifferent.

Upon the whole, that eye is generally good where the eye-lids are thin, where the outward coat or tunicle of the eye is alſo thin and delicate, where the caruncle next the noſe is ſmall and dry, where the eye is tranſparent and ſprightly, when a horſe has a bold reſolute look, and takes notice of objects without fear. On the other hand, when a horſe moves his ears backwards and forwards, and ſeems ſurpriſed at every noiſe or motion of the hand; when he raiſes his feet high, is uncertain in his walk or ſtep, and unequal in his goings, when his eyes appear full and ſwoln with a fleſhy circle round them, or when they are ſunk or flat, or of a longiſh oval figure, when the outer coat is thick, and covers a great part of the eye-ball, and the glands or kernels of the eye are ſpongy and moiſt, all theſe denote the badneſs of the eyes, and are often the forerunners of blindneſs. *Gibſon's Farriery, Vol.* I. *p.* 14.

EYE *of a tree*, a ſmall pointed knot to which the leaves adhere, and from which the ſhoots or ſprigs ſpring forth.

EYE, among gardeners, implies the ſmall bud or ſhoot inſerted into a tree.

EYE-LID, the membrane that covers the eye.

If the eye-lid of a horſe is wounded and cut through, and the cut divides it ſo as the lips part one from the other, it ought to have a ſtitch with a ſtrait needle, ſuch as the ſurgeons uſe for ſuperficial wounds, and not to be drawn too cloſe, but juſt ſo far as to bring the edges together; and this is yet the more neceſſary when the eye-ball happens to be wounded through the eye-lid, that there may be room for the diſcharge of the matter. I have obſerved that the eye-lid requires but one ſtitch, for when there are more, and theſe purſed together, as the farriers generally do, and the lips drawn cloſe, ſuch ſtitches will break in twenty-four hours, and leave the wound in a worſe condition than it was at firſt.

The proper dreſſing for wounds of the eye, is honey of roſes, and tincture of myrrh, viz. one dram of the tincture to an ounce of the other. The beſt way of uſing it is to dip a pledgit of lint in this mixture, made warm, and applied to the wound, for tow and hurds are too harſh for the eye. This dreſſing may be repeated once a day, until the wound is healed up and cicatriſed, and it will ſeldom fail of ſucceſs. *Gibſon's Farriery, Vol.* I. *p.* 320.

F.

FAL FAL

FALLOW, land ploughed, but not ſown, being left to reſt after the years of tillage.

If the farmer finds that one ſummer's fallow does not entirely anſwer the purpoſe of dividing and looſening the earth, it is his intereſt to continue it with another. M. Tull confirms this, by inſtancing a poor man, whom neceſſity compelled to take this method, becauſe he could not get ſeed for his ground after he had tilled it the firſt year. The conſequence was, that his crop was worth more than the value of the land it grew on. Mr. Maxwell too mentions another, who, from a like neceſſity, followed the ſame courſe upon almoſt his whole farm, had ſuch a crop as enabled him to pay many debts, and, by continuing the ſame practice, came in a few years to be in a condition to purchaſe the farm.

When the huſbandman intends to break up any piece of land, the firſt thing neceſſary is carefully and judiciouſly to examine the ſurface of the ground, and its depth. If the ſurface be covered with a thick, ſtrong, fibrous turf, and the mould underneath ſufficiently deep, his beſt, and indeed the only right method of proceeding, is excellently well directed by the marquis of Turbilly. But if, on the contrary, the upper mould ſhould be ſhallow, or ſo thin turfed as not to be fit for burning, he muſt obſerve whether his ſoil be of a ſtrong, or of a light quality. Under the former of theſe are included all deep hard clays, of what colour ſoever; all ſtiff binding earths, and ſuch as, after being expoſed to the ſun, or froſt, grow hard and ſtony; with ſuch as chop and cleave upon their ſurface in the heat of ſummer: and under the latter are ranked (the repetition may be excuſable here for the ſake of perſpicuity) all ſandy, mouldering, gravelly, mellow ſoils; all looſe and open earth, of what nature ſoever; all ſuch as are not ſticky, but will ſoon dry after rain; and, inſtead of lying in great lumps after ploughing, are eaſily apt to diſſolve, and crumble into mould, not being ſubject to bind by the heats in ſummer, or froſt in winter.

If, upon examination, the ſoil is found to be of the ſtiff kind, particular care muſt be taken to turn down its ſurface in the latter end of autumn, that what fibrous roots there are in it may be the more effectually rotted againſt the ſummer ploughing, and that the earth may be mouldered, or mellowed, by the winter's froſt and rains.

When ploughed land is intended to be fallowed, it ſhould likewiſe be ploughed in the autumn, as ſoon as the ſeed time permits, and laid as rough as may be, eſpecially if it be a ſtiff ſoil, that the winter's froſt may mellow it.

In the ſpring, the farmer ſhould take the earlieſt opportunity that his ſpring crops may admit of, to give his fallows a ſecond ploughing acroſs the former; after which the ground ſhould be well harrowed, not only to break the clods, but to pull up ſuch roots as are not yet rotted, that they may be gathered into heaps and burnt. It is eſſentially neceſſary that this, and all the following ploughings and harrowings be performed in dry weather; becauſe, as the purpoſe here is thoroughly to looſen the mould, ſpecial care ſhould be taken to avoid every thing which might counter-act that intention. The farmer cannot wiſh for a greater benefit to his huſbandry, than moderate ſhowers after each fallow, to bring the ſeeds of every weed to vegetate, in order that, being turned down by ſeveral ploughings, they may be the more effectually deſtroyed.

It ſeems needleſs to mention when the future ploughings ſhould be given, becauſe the farmer ſhould take every opportunity of repeating both them and the harrowings, in full confidence that he cannot over-do it, eſpecially in ſtrong ſoils; in which he may alſo be equally certain, that he cannot err in ploughing too deep: for it is of great conſequence, not only that the roots have a ſufficient depth of mould to penetrate in, but alſo that the cold clay be removed to as great a diſtance as poſſible from the ſurface; becauſe by its retaining the water, the roots of plants are chilled and killed, eſpecially in the winter, when they reach ſuch ſtagnating wet. If any manure is applied to alter the quality of the ſoil, it cannot be laid on too early in the ſummer, that the ploughings may the more effectually mix it with the earth; but if only compoſt be uſed for enriching the ſoil, it need not be ſpread till juſt before the laſt ploughing.

Authors give directions for ploughing land into many different forms, moſtly ariſing from the different natures of ſoils, but too often from the particular long eſtabliſhed cuſtom of countries, the reaſonableneſs of which is not always ſufficiently conſidered.

Where there is a deſcent for water, all lands ſhould be laid flat, becauſe, in that way, the rains will undoubtedly give a more equal nouriſhment to the crop, than when they are raiſed in ridges. The practice of laying light ſoils into narrow ridges, for wheat, is certainly owing to want of attention; and even in ſtrong land ploughed for winter fallowing and ſowing, we are much inclined to think that the beſt way would be, inſtead of ſingle bouts, or narrow ridges, to make the ridges very broad, and lay them up high: for if the ground is level, the water will lie in the parting thoroughs, and, by ſoaking into the ſides of the ridges, make it ſo poachy, as to render it very unfit to be worked, till late in the ſpring, unleſs the ſeaſon be very dry; or, if there is much

deſcent, great part of the beſt ſoil will be carried off. For the ſame reaſons the ſides of hills ſhould always be ploughed almoſt, but not quite, horizontally, that the parting thoroughs, lying open, may ſerve for drains to the water: beſides which, the ploughing of ſuch declivities in this ſloping manner is by much the leaſt laborious both to men and cattle. The furrow here ſhould always be drawn oblique, as Columella directs, ſometimes a little toward the higher, and ſometimes toward the lower part of the hill, ſo that the direction may be altered in each ſubſequent ploughing.

The erroneous opinion of thoſe who imagine that the ſurface of the ground is conſiderably enlarged by ploughing it into high ridges, and that it therefore affords a larger ſpace for the growth of plants, is thus judiciouſly refuted by M. Duhamel.

"The produce of a ſloping ſurface is not greater than that of a plane equal in extent to the baſe of the ſlope: for as the plants grow perpendicular to the horizontal baſe, there is no point of the ſlope which does not anſwer vertically to a point of that horizontal baſe: therefore ſuppoſing the furrows of a piece of ground ploughed in broad lands to be ſix inches deep, and the ridges ſix feet wide; the ſlope from the bottom of the furrow to the middle of each ridge will be one foot in ſix, which is indeed conſiderable: but ſtill the ſurface of the ridges will be to that of their horizontal baſe, only as ſeventy-ſix are to ſeventy-five: a ſmall advantage; eſpecially when compared to a ſixth part of the ground, which is taken up by the furrows, and in which no corn is ſowed."

Another, and that very eſſential advantage of fallowing, not yet ſufficiently inſiſted on, is the deſtruction of weeds, which are one of the farmer's greateſt enemies. By weeds, we here mean every plant which grows ſpontaneouſly in the field, without having been purpoſely ſown, and which it is not the huſbandman's intention to cultivate. All theſe ſhould be rooted out. It would be needleſs to enumerate them after this general definition; and perhaps equally ſo to obſerve, what every huſbandman muſt know, that cockle, darnel, fox-tail, wild poppies, wild vetches, wild oats, dog's graſs, colt's foot, melilot, knot-graſs, thiſtles, and charlock, are the moſt hurtful ſpecies of theſe noxious growths, and the moſt difficult thoroughly to extirpate.

To prevent the increaſe of weeds, they ſhould be deſtroyed before their ſeed is ripe: but that is not poſſible in lands which are ploughed in the common way; becauſe, as they grow intermixed with the corn, and ripen ſooner than wheat, their ſeeds ſow themſelves; neither can they be extirpated by reſting the land; for the ſeeds of ſome of them will remain ſound ſeveral years in the earth. If a field in which there are many poppies, or red weeds, as they are called in ſome places, be ſowed with ſaintfoin, ſcarce a poppy will appear the ſecond year: but when the ſaintfoin is ploughed up, even at the end of nine years, the red-weed frequently appears anew, which can hardly be owing to any other cauſe, than that its ſeeds have remained ſound in the earth during all that time; for very few of them, in proportion to the quantities which ſpring up, can have been brought from the neighbouring grounds, or in dung. This is confirmed by an experiment which M. Duhamel made. He ordered the earth, with which a ditch had been filled fifteen or twenty years before, to be dug out, and ſpread upon a piece of ploughed land. Several plants, of different kinds from any that were in the field, ſprouted up in the place where this earth was laid. Conſequently they were produced by ſeeds which had remained ſound in the ground, during the fifteen or twenty years that this earth had lain in the ditch.

This is an important reaſon for ploughing thoroughly all lands which are fallowed; for it is certain, that as numbers of ſeeds ſhoot up during the fallow, repeated ploughing will deſtroy many of them. But there are ſeveral kinds of plants, ſuch, in particular, as wild oats, and fox-tail, the ſeeds of which do not ſprout till they have remained two or three years in the earth; nor will culture make them grow ſooner. Such, at leaſt, is M. Duhamel's opinion, as well as that of ſeveral other very ingenious gentlemen, though it muſt be confeſſed, that ſome late experiments ſeem to contradict it, and to ſhew that the ſeeds of thoſe plants which he ſays require being three years in the ground before they will grow, were only buried ſo deep, in the caſe he mentions, as not to be able to vegetate, which they afterwards did when laid within reach of the influences of the air, rain, dew, &c. If ſo, though the increaſe of weeds may be prevented for ſeveral years, by ploughing, cutting, pulling them up, &c. yet it is evident, that the repeated ploughing of fallow lands, far from immediately deſtroying theſe kinds of weeds, will rather help them to grow, when their ſeeds are brought within a proper diſtance from the ſurface, and their time of ſprouting is come. But then, allowing that ſome of their ſeeds may be thus brought up by each ploughing, for a while, it cannot be long before all of them will have ſprouted, after which the ground may be kept quite clear, with proper care.

Huſbandmen have not yet found a more effectual method to deſtroy weeds, than by ſowing the ground out of ſeaſon; that is to ſay, by ſowing oats the year that barley ſhould be ſowed. It has been experienced, that by this means, ſome kinds of weeds have been deſtroyed, which, appearing only every third year, never ſhew themſelves, in the uſual rotations, but amongſt wheat. But the farmer loſes a crop by this means, and ſtill has ſo many weeds left, that he is obliged to hire people to weed his corn. This is done two ways.

A number of women place themſelves in a row, and, with a hoe made for the purpoſe, cut up all the weeds they ſee, ſuch as thiſtles, blue-bottles, poppies, &c. But many of theſe, when young, frequently eſcape their notice; in which caſe the hoeing muſt be repeated when they are grown larger; and the ſmaller weeds, ſuch as wild vetches, wild oats, darnel, knot graſs, fox-tail, young poppies, &c. which are at leaſt as hurtful as the other, remain in the field. Beſides this, in cutting the weeds, it is ſcarce poſſible not to cut down ſome of the corn; and the roots of the thiſtles and other biennial plants which are cut, produce two or three new ſtalks in lieu of the old one; by which means the evil is increaſed.

The other method of clearing corn, is by hand-weeding it; but this is ſeldom practiſed by farmers, becauſe it is too expenſive: and indeed the women and children generally employed to do this work, moſt commonly pull up a great deal of corn with the weeds; ſo that, what with that, and with their trampling, and dragging their bags of weeds over it, they frequently do more hurt than good, eſpecially if the earth be moiſt.

The ſureſt way to deſtroy weeds, is to continue ploughing

A Fallow-cleaning Machine, Manchester in Lancashire.

Invented by Mr. Aaron Ogden, a Smith at Ashton Underline, near

Fig. 1.
Drill Rake.

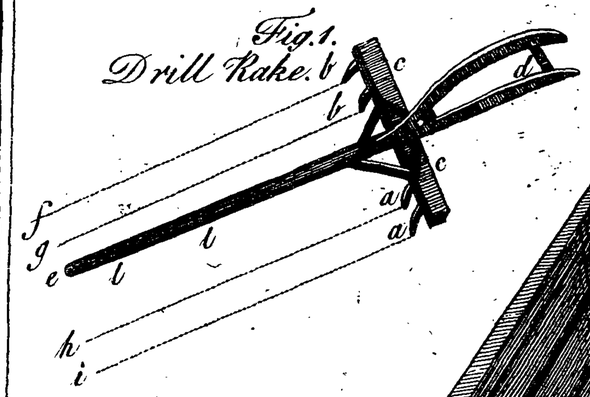
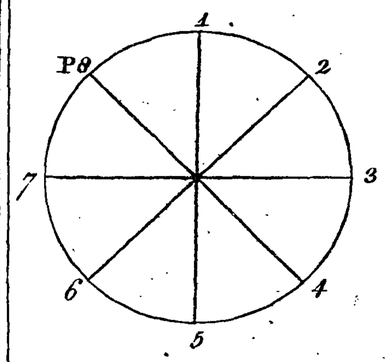
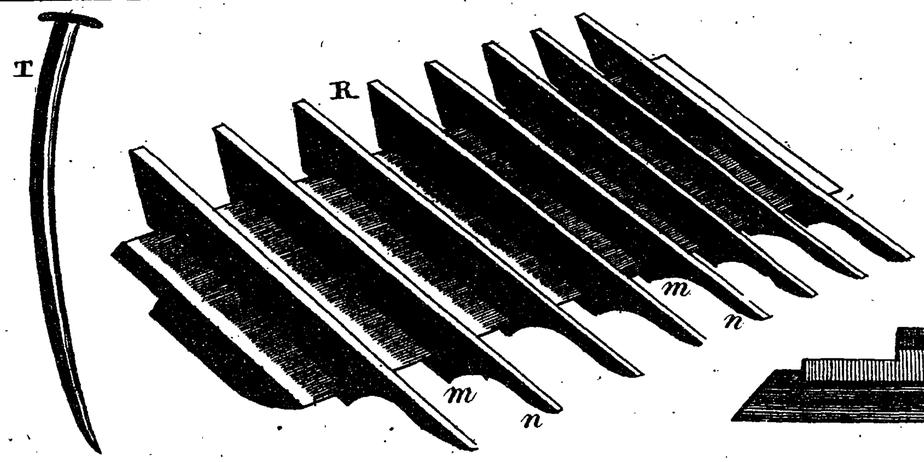


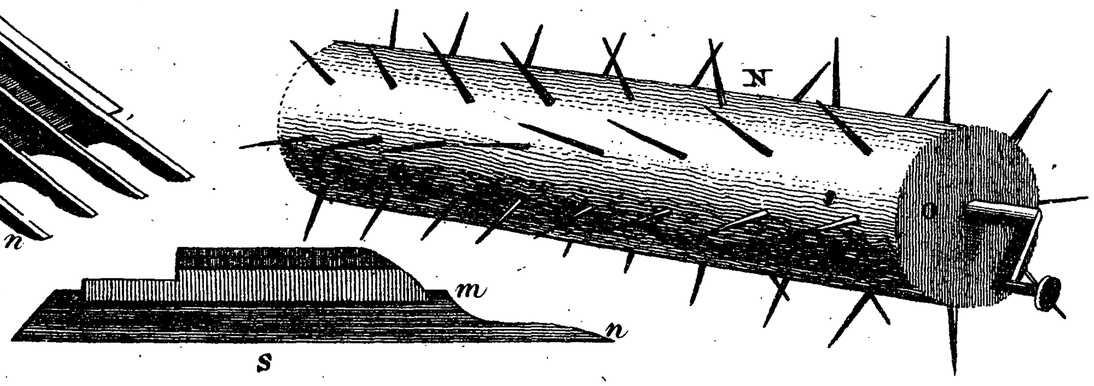
Fig. 2.

Fig. 3.









ing while the corn grows: but this can be done only in the New Husbandry.

Weeds may be ranked under four general classes: first, such as have creeping perennial roots: secondly, such as grow in cold wet soils: thirdly, such as are of a large succulent body; and, fourthly, such as having small seeds, or seeds which ripen before the corn, sow themselves. Each of these require a different treatment.

The first sort cannot be destroyed but by repeated summer fallows, by which their roots are cut, and turned up to be withered by the sun and winds, after which they are dragged out by harrows, and should be burnt. This, repeated as often as the farmer conveniently can, especially during a dry season, can scarcely fail to have the desired effect. Colts-foot, which is propagated by the root, and is a very pernicious weed, may likewise be destroyed by sowing the ground with rye-grass, or any plant which, coming up early in the spring, shades and smothers it; for that will kill it in a few years. The second kind are destroyed by draining the earth of its superfluous moisture, and by manuring it with lime, ashes, gravel, shelly sea-sand, and other proper correctives for such soils.

The third are extirpated by cutting them down when in full sap and vigour: for the sap being thereby suddenly interrupted in the course of its circulation, stagnates in the roots, and putrifies there. A few weak lateral shoots may be made; but if they are likewise cut in the same manner, the roots will putrify intirely by degrees, and instead of annoying, will become a manure.

The fourth class can be destroyed only by frequent fallows, and constant cutting, or rather ploughing them down before they run to seed. Some, for instance the wild oats, may be mowed for hay: but it is much more beneficial to the land to plough them in: because, by that means, instead of being exhausted by frequent crops, it is manured by those enemies to useful grain.

Fallowing is an important operation in agriculture; the beneficial effects of it consists in three particulars. 1°. The repeated cultivation of the land, is the most effectual method of extirpating weeds: if they are annual weeds, the seeds of them are encouraged to grow, and the next ploughing buries and kills them. And if they are large perennial weeds, the earth being loosened by the tillage, the large weeds are then easily pulled out by harrows, and then dried and burned. 2°. The land is opened and pulverized to a great degree of fineness, by the repeated tillage; and 3dly, by the turning of the mould often; a new surface is every time exposed to the atmosphere, whereby the soil is impregnated through its whole substance, with the fertilizing particles that enrich the earth. No person of observation, conversant in agriculture, can doubt of this effect of the air or atmosphere, enriching of well cultivated land that is exposed to it, and is abundantly proved by the new husbandry.

From this description of the benefit of a good fallow, it will be evident, that the common fallowing is far short of answering the purposes of good fallowing. Three, or sometimes four ploughings of land, where the furrows are turned over almost whole, and couch, and other rank weeds are suffered to grow up for feeding sheep, do not deserve to be called good fallowing, as not one of the ends of good fallowing are attained by such slovenly culture.

Thorough good tillage, in whatever manner performed, is greatly beneficial to land; but one of the most effectual methods of fallowing, is to lay the land up in high, narrow one bout ridges, which are easily cultivated with a plough, that has a doubled finned share, and a double mould board. The share of such a plough being entered in the middle, and drawn a long through one of these narrow ridges, splits it in the middle, turns the mould equally to the right and left, and ploughs one of them at one draught; and the mould of each ridge, is thus raised into a new ridge upon the former furrow. The ridges are sometimes harrowed down, which will well mix the mould, and pull up the large weeds and roots, and then the ridges are raised again as before, across the former ridges, if that can be conveniently done, if not, the new ridges, if they do not stand exactly where the others did, will be composed partly of the earth that may have been missed by the former ploughings, and the land will by that means be all tilled to an equal depth.

By this way of ploughing, the ridges are tilled, each at one furrow, and if they are three feet broad, would, in common ploughing, require four furrows to plough them on level ground, and time in proportion to do the work. The mould in this way, is also made so fine and light, that two horses will commonly plough as much ground as three or four can do, when it is out of tilth, and bound together by weeds. The tillage should be performed when the earth is dry, and repeated as often as the weeds spring up: for they should not be suffered to grow large, much less to run to seed.

The farmers cannot by common fallowing extirpate the weeds, and clean the land well in one year, and few of them are willing to fallow another year. But in this method of fallowing, the weeds may be conquered in one winter and summer, and when once the land is made clean, it may be kept so, by a proper change of crops, and the hoeing husbandry.

FALLOW, also signifies a pale red colour.

FALLOW-CLEANSING *Machine*, an instrument invented by Mr. Aaron Ogden, a smith at Ashton-under-Line, near Manchester, in Lancashire.

This machine, which bids fair to be of very great use in husbandry for cleansing fallows from weeds, &c. which waste the riches of the soil, will be very easily understood from the drawing we have given of it on Plate XV. Fig. 2. Where,

A, A, is the frame; B, the first roller; C, the second ditto, in which last are two cranks to move the arms D, D, which work the rake up the directors fixed on the plank E. The under side of the lower ends, or shares, of these directors, are sharp to cut the clods, and let them come on the upper side. Each alternate heel of the share is longer than the intermediate one, that they may not have more than one half to cut at once.

At the back of the plank E, are two screws to let it loose, that the directors may be set higher or lower. The shares are to penetrate the ground two or three inches, to raise the quicks till the rake I, I, fetches them into the cart H, where a man must be ready with a muck-hook to clear them backward when gathered.

In the rake I, are two teeth for every space of the directors, that stones, &c. may be gathered without damage.

K, K, are two staples, by which the machine is drawn: under them at *b*, are two hooks, placed low to raise the machine in turning, by the help of the traces; and the axle-tree of the cart should be fixed upon a pin, that it may turn like a waggon.

F, F, are the triggers to throw the rake behind the roots. The long teeth at G, G, are to cleanſe the roller C.

I, I, is the rake which gathers up the weeds into the cart H, and is drawn above the trigger F, by the working of the arms D, expreſſed by the dotted lines at *d d*, *i i i*.

The triggers F, of which there is one on each ſide, move on the pivots *a*; ſo that when the points *b*, of the rake I, having been drawn up by the directors E, to the part marked *c*, the trigger, giving way, permits the rake to paſs; but immediately falling, the rake returns along the upper ſurface of the trigger marked *e*, *e*, and of courſe falls on the weeds when it comes to the end, a little beyond the pivot *a*.

The reader will obſerve that the boarding is taken away on one ſide, in the Plate, in order to give a more perfect view of the inner parts of the machine; and, in fact, it would, perhaps, be better if all the boarding, marked L, L, L, was taken away, and frame work put in its ſtead.

The cart H, might undoubtedly alſo be made lighter.

The wheels M, M, appear, in the plate, to be made of ſolid wood; but there is no neceſſity they ſhould be ſo.

At N, is another view of the roller C, by which the diſpoſition of the ſpikes may be eaſily comprehended.

Suppoſe the circle O, deſcribed by the end of the roller N, to be divided by four ſtrait lines into eight equal ſegments, as repreſented at P. Let the ſame be done at the other end of the roller, and parallel lines be drawn from one correſponding point to the other, the length of the roller: mark the points with figures 1, 2, 3, 4, 5, 6, 7, 8; afterwards draw oblique lines, as from 1, at the end O, to 2, at the other end, and from 2 to 3, &c. on theſe oblique lines the ſpikes are to be fixed, at equal diſtances, in eight circles, deſcribed on the circumference of the roller.

The ſpikes of the ſmall roller B, are fixed in the ſame manner, except that the diameter being ſmaller, there are only ſix inſtead of eight rows.

R, is another view of the directors, with the plank E, on which they are fixed; and S, is a ſection of a part of the plank, with one of the directors as fixed, in which may be ſeen the heel *m*, from whence to the point of the ſhare *n*, is a ſharp cutting edge. See the ſame letters in figure R.

At T, is one of the long teeth to be ſeen at G: it is bent towards the roller C, which it ſerves to cleanſe. When the end of the rake *b*, after riſing above *c*, is puſhed, by the motion of the arms D, D, along the upper part *e*, *e*, of the trigger F, and comes to the end beyond *a*; as it falls, the part of the arm, marked *o*, reſts in the notch *p*, till it is again raiſed by the motion of the roller C, with the rake.

The roller C, is to be one foot diameter, the ſpikes nine inches long, that they may go through the furrow (if the ſoil ſhould be looſe) into the hard earth, the more effectually to work the rake, which otherwiſe might be ſo over-charged as to cauſe the roller to drag without turning.

In the rake-ends *b*, there ſhould be pivots, with rollers or pullies on, to go in the groove, to take off the friction; and they would likewiſe take the triggers more ſurely as the rake comes back.

The rake ſhould alſo be hung ſo far backwarder, that when it is fallen, the arms of it may lie in the ſame plane, or parallel, with the directors, on which it comes up (which will require the frame to be two inches longer in the model.) This will cauſe the rake to fall heavier, and drive the teeth into the roots, and bring them up without ſhattering. Theſe teeth muſt be made of ſteel, very fine, and ſo long as to reach down to the plank on which the directors are fixed, that is to ſay, ſix inches long (the directors are alſo to be made ſix inches broad above the plank.) The rake-head ſhould alſo fall a little before the crank is at its extremity, which will cauſe the rake to puſh forward to let the teeth come into the roots. The rake-teeth muſt drop in the ſame plane with the roller and wheels, or on the ſurface of the earth. No more ſpace ſhould be given from the roller C, to the long teeth, at G, G, than that the rake may juſt miſs the ſpikes of the roller C, and fall on the places before mentioned.

As the firſt roller B, was intended to cleanſe the ſecond C, more than any other uſe, it may be omitted when the machine is made in large, as Mr. Ogden has lately found that the long teeth at G, G, anſwer the end alone, and this renders the machine about a ſixth part ſhorter.

Now, to ſuit any ſort of earth, there ſhould be to each machine three planks, with directors at different ſpaces, to uſe occaſionally: in the firſt, the ſpaces between the directors ſhould be eight inches wide, in the ſecond ſix, and the third four. This will anſwer the ſame end as having ſo many machines.

As there may be ſome objections to the rake not leaving the roots when it has brought them up, Mr. Ogden has ſeveral methods of cleanſing it; but as he would make it as ſimple as poſſible, he chuſes to let it be without them at preſent: but ſuppoſe it ſhould bring ſome roots back again with it, it will probably loſe them before it gets back to the extremity; whence they will lie light, and be of but little detriment to the others coming up.

Mr. Ogden would have the firſt machine made four feet ſix inches wide, the teeth divided into equal ſpaces, the outſides into half ſpaces.

FAN, an inſtrument for winnowing corn. *See the article* WINNOWING.

FANTOME CORN, thin, or light corn, that which has but little bulk or ſolidity.

FARCY, or *Farcin*, a diſtemper to which horſes are too often ſubject. It is a diſeaſe of the blood veſſels, generally following the courſe of the veins, and, when inveterate, thickens their coat and integuments.

At firſt one or more ſmall ſwellings, or round buds like grapes or berries, ſpring out over the veins, and are often exquiſitely painful to the touch; in the beginning they are hard, but ſoon turn into ſoft bliſters, which, when broke, diſcharge an oily or bloody ichor, and turns into very foul and ill-diſpoſed ulcers. In ſome horſes it appears on the head only; in ſome on the external jugular; in others on the plate-vein, and runs downwards on the inſide of the fore-arm towards the knee, and very often upwards towards the briſket; in ſome the farcy ſhews itſelf on the hind parts, about the paſterns, and along the large veins on the inſide of the thigh, riſing upwards into the groin, and towards the ſheath; and ſometimes the farcy makes its appearance on the flanks, and ſpreads by degrees towards the lower belly, where it often becomes very troubleſome.

When the farcy appears on the head only, it is eaſily cured,

cured, especially when it is seated in the cheeks and forehead, the blood-vessels being here small; but it is more difficult when it affects the lips, the nostrils, the eyes, and kernels under the jaws, and other soft and loose parts, especially if the neck-vein becomes chorded. When it begins on the outside of the shoulder or hips, the cure is seldom difficult; but when the farcy arises on the plate-vein, and that vein swells much, and turns chorded, and the glands or kernels under the armpits are affected, it is hard to cure; but more so when the crural veins within-side of the thigh are chorded, and beset with buds, which affect the kernels of the groin, and the cavernous body of the yard. When the farcy begins on the pasterns or lower limbs, it often becomes very uncertain, unless a timely stop is put to it; for the swelling in those dependant parts grows so excessively large in some constitutions, and the limbs so much disfigured thereby with foul sores and callous ulcerations, that such a horse is seldom fit for any thing afterwards, but the meanest drudgery: but it is always a promising sign, wherever the farcy happens to be situated, if it spreads no farther. It is usual to affect only one side at a time, but when it passes over to the other, it shews great malignancy; when it arises on the spines, it is then for the most part dangerous, and is always more so to horses that are fat and full of blood, than to those that are in more moderate case. When the farcy is epidemical, as sometimes happens, it rises on several parts of the body at once, forms nasty foul ulcers, and makes a profuse running of greenish bloody matter from both nostrils; and soon ends in a miserable rot.

From this description of the farcy, it will appear how greatly those may be disappointed, who depend on some single specific drink or ball for a certain cure; for the symptoms are sometimes so favourable, that it is easily conquered by a very simple management; and when it arises superficially upon the smaller vessels, it will often go off, with moderate labour, without any other means than bleeding. Such instances as these may easily give a reputation to things of no great efficacy, and bring them into esteem: but whoever has acquired any true notion of the farcy, will know that this distemper is not to be conquered but by such things as are fitly adapted to the various symptoms that occur in the different stages of it. To avoid therefore the perplexity that arises from the various complications so usual in the farcy, we shall consider it in its different states, or degrees, viz. when it seizes only the smaller vessels; when the larger veins are chorded, and the feet, pasterns, and flanks affected; and lastly, when the farcy, beginning on one side only, breaks out on the other also, and affects the whole body.

When the farcy makes its first appearance on the head, it rises on the cheeks and temples, and looks like a network, or small creeping twigs full of berries. Sometimes it inflames the eye, and sometimes little blisters or buds run along the side of the nose. It arises often on the outside of the shoulder, running along the small veins with heat and inflammation; and sometimes a few small buds appear near the withers, and on the outside of the hip. In all these appearances, the disease being superficial, and affecting only the smaller vessels, is easily conquered by the following method, when taken in time; for the simplest farcy, if neglected, may degenerate into the worst sort.

This distemper then being of an inflammatory nature, and in a particular manner affecting the blood vessels, must necessarily require large bleeding, particularly where the horse happens to be fat and full of blood. This always checks the beginning of a farcy, but is of small service afterwards; and if a horse is low in flesh, the loss of too much blood sometimes proves injurious. After bleeding, let the horse have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood, and open the body; and then give nitre three ounces a day, for three weeks or a month; and anoint the buds and swellings with the following ointment twice a day.

"Take ointment of elder four ounces, oil of turpentine two ounces, sugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot."

The buds sometimes by this method are dispersed, leaving only little bald spots, which the hair soon covers again. When they break and run, if the matter be thick and well digested, they will soon be well: but in order to confirm the cure, and to disperse some little lumps, which often remain for some time on the skin without hair, give the liver of antimony for a month; two ounces a day for a fortnight, and then one a day for the other fortnight; by following this method, a farcy which affects only the small vessels, may be stopped in a week or ten days, and soon after totally eradicated.

When the farcin affects the larger blood vessels, the cure is more difficult; but let it always be attempted early: therefore, on the plate, thigh, or neck-veins appearing chorded, bleed immediately on the opposite side, and apply the following to the chorded vein.

"Take oil of turpentine in a pint bottle six ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by a little at a time, otherwise the bottle will burst; when it has done smoaking, drop in more oil of vitriol, and so on till all is mixed."

This mixture is one of the best universals in a beginning farcy; but where it is seated in loose fleshy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are necessary.

Rub the parts first with a woollen cloth; and then apply some of the mixture over the buds, and wherever there is any swelling, twice a day. Give the cooling physic every other day, and then three ounces of nitre every day for some time. This method must be continued till the buds digest, and the chord dissolves; and when the sores run plentifully, the matter digests well, and the lips and edges are no ways thick or callous, you may expect a speedy recovery; yet to confirm the cure, and prevent a relapse, give the liver of antimony or crude antimony, as before directed; and to heal the sores and smooth the skin, dress with bees-wax and oil.

When the farcy begins on the flanks, or towards the lower belly, it often takes its rise from a single puncture of a sharp spur. The pain and smarting is one sure sign to distinguish the farcy from common accidents: the staring of the hair, which stands up like a tuft all round the buds or blisters, and the matter that issues from the buds, which is always purulent, and of a clammy greasy consistence, are other certain signs. After bathing with the mixture abovementioned till the ulcers are smooth and healing, should the swelling not subside, to prevent

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the ſpreading of the buds, and to diſperſe them, bathe with either of theſe mixtures as far as the center of the belly; and at the ſame time give a courſe of antimonials, as will preſently be deſcribed.

"Take ſpirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white wine vinegar or verjuice, ſix ounces."

Or take the following:

"Take ſpirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice ſix ounces, white vitriol, diſſolved in four ounces of ſpring water, one ounce; mixed together."

In the lower limbs the farcy lies ſometimes concealed for a great while, and makes ſo ſlow a progreſs, that it is often miſtaken for greaſe, or for a blow or kick; and goes by the general appellation of a humour ſettled there. In order to diſtinguiſh one from the other, we ſhall obſerve that a kick, or bruiſe, is generally attended with a ſudden ſwelling, or a contuſed wound, which for the moſt part digeſts eaſily; the greaſe is alſo a ſmooth ſwelling that breaks out above the bending of the paſterns backwards; but the farcy begins on the paſtern-joint uſually with one bud, and runs upwards like a knotty crab-tree.

Very ſimple means has ſometimes ſtopped it, before it has began to ſpread; a poultice with bran and verjuice bound round the part, and renewed once a day, will often alone ſucceed; and if proud fleſh ſhould ariſe, touch it with oil of vitriol, or aqua-fortis, an hour before you apply the poultice; for when the diſtemper is local, as we ſuppoſe it here, it is to be conquered by outward applications.

When the diſtemper grows inveterate, and reſiſts the above method, and the veſſels continue chorded, Gibſon recommends the following mixture.

"Take linſeed oil half a pint; oil of turpentine and nitre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the ſoldiers ointment, two ounces, or oil of bays; oil of origanum, half an ounce; double aqua-fortis, half an ounce. After the ebullition is over, add two ounces of Barbadoes tar."

Rub this into the chorded veins, and wherever there is a ſwelling, once in two or three days; but if the orifices are choaked up with proud fleſh, or the ſkin ſo much thickened over the ulcers as to confine the matter, in either caſe it is neceſſary to make an open paſſage with a ſmall hot iron, and deſtroy the proud fleſh, after which it may be kept down by touching with oil of vitriol, aqua-fortis, or butter of antimony. A ſalve may alſo be prepared with quick-ſilver and aqua-fortis, rubbing any quantity of the former with enough of the latter, to the conſiſtence of a liniment; ſmear the ulcers with this whenever they appear foul, and you will find it preferable to moſt other eating ingredients.

Our farriers after opening the buds, put in uſually a ſmall quantity of corroſive ſublimate or arſenic, which they call coring out the farcy; this may anſwer where the buds are few, and not ſituated near large blood veſſels, joints, or tendons: others uſe Roman vitriol, or ſublimate and vitriol, in equal quantities: but let it be remembered, that many a horſe has been poiſoned by theſe medicines ignorantly uſed, and in too large quantities, which ſhould be a caution to huntſmen not to ſuffer their hounds to feed on the carcaſes of farcied horſes, as the greateſt part of a pack have been poiſoned by that means.

I ſhall now mention ſome of the deſperate methods, and more violent kinds of medicines given by ſome internally: thus from four to eight ounces of lapis calaminaris, to which two ounces of tutty, finely powdered, is added, with other metallic ſubſtances have been given. Some give a pound of barrel ſoap boiled in ſtale beer; with ſavin, rue, and other herbs of that intention: others go yet further, being determined to kill or cure, by giving drinks prepared with green vitriol, roche-allum, Roman vitriol, oil of vitriol, boiled in chamber-lie, with hemp-ſeed, hemlock, and common ſalt. Thoſe who uſe nothing but the decoctions or juices of herbs, ſuch as wormwood, rue, or elder particularly, ſtand a much better chance for a cure, if given in time; but when the diſtemper is grown inveterate, nothing comes in competition with mercurial and antimonial medicines.

The following balls are proper in every ſtate of the farcy: and when the diſtemper has been in its infancy, before the ſkin was much defaced, has often cured it in a week or two, by giving them only once or twice a day: but in an old farcy, they ſhould be given for two or three months together.

"Take of native cinnabar, or cinnabar of antimony, eight ounces; long birthwort, and gum-guaiacum powdered, of each four ounces: make into a paſte with honey, and form into balls of the ſize of a large walnut, and roll them into liquorice powder."

The tedioufneſs of this courſe has encouraged the giving of mercurials, and indeed, where they are directed with ſkill, they muſt be attended with ſucceſs; the ſtronger preparations, as the red and white precipitates, and turbith, being combined with ſharp ſaline parts, may be hazardous and injurious, but the latter given in ſmall quantities have been found very ſucceſsful in ſuch kind of inveterate diſorders. Mr. Gibſon ſays, he has given it to a dram at a doſe, where the limbs have been greatly ſwelled; that in forty-eight hours the ſores were all dried up, and the limbs reduced; but that it made the horſe ſo violently ſick for ſeveral days, and ſcoured him to ſuch a degree, that it could not be repeated.

One would have thought, that the ſucceſs attending this medicine ſo ſuddenly might have encouraged Gibſon to have made further trials in ſmaller quantities; which, had he done, it is more than probable, he would not have been diſappointed: for the grand ſecret in giving mercurials, as alteratives, is the introducing them into the blood, without operating on the ſtomach and bowels; and to do this effectually, they muſt be given in ſmall quantities, and ſo bridled, as to controul their force on the firſt paſſages: taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and ſafely.

The method I would recommend is as follows: give one ſcruple, or half a dram of turbith, mixed into a ball, with an ounce of Venice ſoap, every other night for a fortnight; then abſtain a week or ten days, and repeat it again. Should this ball purge, or make the horſe ſick, mix it up with two drams of philonium, or with four or five grains of opium, or camphor; with theſe reſtrictions, it may be given for ſome weeks; but ſhould the horſe's mouth be found tender or ſore, you muſt refrain giving, till that complaint is removed by gentle purges; and then return to it again in ſmall quantities; for as the effects of mercurials are very different in the different conſtitutions, both

both of horſes, as well as men, ſo the quantity muſt be varied in proportion to the operation, which is not intended here to be ſenſible, but to work imperceptibly on the blood and juices, correcting them as a powerful alterative. During the whole courſe, particular care ſhould be taken that he gets no cold.

Two ounces of quickſilver, divided with an ounce of turpentine, and made up into four balls, with diapente, and gum guaiacum, of each two ounces, and a ſufficient quantity of honey, have, for this purpoſe, been ſucceſsfully given, one ball twice a week; but gentle purgatives ſhould be interpoſed, to prevent a ſalivation, which ſome horſes are very prone to, on taking mercurials, though in ſmall quantities.

Dr. Bracken recommends the knots and chords to be rubbed with the mercurial ointment before they break, in order to diſperſe them, and, after breaking, to dreſs the ſores with equal parts of Venice turpentine and quickſilver: if by theſe means the mouth ſhould become ſore, treat as above. This method ſeems to be effectual with proper care.

The following is alſo recommended by the ſame gentleman.

"Take butter of antimony, and bezoar mineral, of each an ounce, beat up with half a pound of cordial ball, and give the bigneſs of a walnut, or three quarters of an ounce every day, for two or three weeks, faſting two or three hours after it."

As moſt preparations from antimony are of uſe in the farcy, ſo from two drams of antihecticum poterii to half an ounce, may be given with a bit of cordial ball every other day, for ſome time; for in theſe obſtinate caſes the very craſis of the blood muſt be altered, which can only be affected by degrees, and of courſe is a work of time. *Bartlet's Farriery, pag.* 178.

Water-FARCY. *See the article* WATER-FARCY.

FARDING-BAG, the firſt ſtomach of a cow, or any other ruminating animal.

FARE *of pigs*, the number a ſow bringeth at one time.

FARM, a portion of ground cultivated either by the owner or a tenant.

The ancient writers of huſbandry, who lived in warm countries, where the heat and moiſture of the air had ſenſible and frequently very dangerous effects on the health of the inhabitants, were very particular in their directions, for the choice of farms or eſtates, and of the ſpots whereon houſes ſhould be built, ſo as to avoid the inconveniencies ariſing from the climate, or from the quality or ſituation of the ground.

Though the temperate air which we enjoy in this iſland renders ſuch directions leſs neceſſary here, yet as ſeveral places in it are remarkably ſickly, and as, even in the moſt healthy ſituations, many houſes and villages are built upon the leaſt healthy ſpots, it muſt be of conſiderable advantage to thoſe who can make their choice, to know what ſoils and places ought to be avoided; and of ſuch as are already fixed, to be acquainted with the means of correcting thoſe inconveniencies which cannot be totally be remedied.

Inſtructions of this kind are now full as neceſſary in our language, as they were ever in the Greek or Latin, the countries in which Engliſh is ſpoken being more extenſive, and more various in their climes, than even the Roman empire was.

The ſacrifices of the ancient Romans ſhew how attentive they were even in the choice of the ground they encamped upon: much more were they ſo in that of the ſituation and nature of the place where they laid the foundations of more laſting buildings. They examined the livers of the cattle fed on the ſpot, when they offered them in ſacrifice; and if theſe were livid or corrupted, they offered others, as the unſoundneſs of the firſt might be owing to ſome caſual diſtemper: but if they were often found to be morbid, they concluded that the air, water, or food, which the place yielded, would have a like effect on human bodies, and therefore ſpeedily left that ground, to ſearch for a better ſituation. If after repeated trials, they found the livers good, they judged the air and food to be ſo likewiſe, and ſettled accordingly. We may ſtill obſerve the good effect of this precaution, in the healthy ſituations of the remains of Roman encampments: for they preferred health to every other conſideration.

The Romans had pleaſure as well as profit, in view, when they bought or ſtocked a farm; and therefore they laid it down as a rule, that no degree of fertility ſhould tempt a man to purchaſe in an unhealthy country, nor the pleaſanteſt ſituation in a barren one. "Buy not too haſtily," ſaid the wiſe Cato, "but view again and again the purchaſe you intend to make; for if it be a good one, the oftener you ſee it, the better it will pleaſe you. Examine how the neighbouring inhabitants fare. Let the country it lies in be a good one; the ways to and from it good; and the air temperate. Let your land, if you can chooſe your ſituation, be at the foot of a hill, facing the ſouth, in a healthy place, where a ſufficiency of labourers, of cattle, and of water may be had. Let it be near a flouriſhing town, the ſea, or a navigable river; or bordering upon a good and well frequented road. Let the buildings upon your ground be ſtrong and ſubſtantial. Do not raſhly condemn the methods of others. It is beſt to purchaſe from a good huſbandman, and a good improver."

Beſides the healthfulneſs of the ſituation, three other things ſhould be particularly attended to in the choice of a farm or eſtate; theſe are the air, the water, and the ſoil. The air ſhould be pure, and temperate; the water wholſome, and eaſily come at, and the ſoil rich.

The knowledge of the healthineſs of the air is, as lord Bacon obſerves, diſcoverable rather by experiment than by reaſon or conjecture.

To examine the moiſture of the air before a houſe is built, wool, or a ſponge, may be hung up in the place, and afterwards compared with ſome of the ſame, expoſed in the ſame manner, and at the ſame time, in another place. According as they gain more or leſs in weight, the air is more or leſs humid.

The air is liable to greater alterations, from heat and cold, in ſome places than in others; and as that inequality in the air is an enemy to health, the moſt equal ſhould be choſen. This is eaſily determined by the thermometer, and by viewing the ſituation of the place; for the intermixture of hills and vallies, though pleaſing to the eye, may be held ſuſpected as to the lengthening of life, becauſe of the variations of heat and cold.

Open places and champaign countries are judged to be healthy, where the ſoil is dry, not parched or ſandy, where wild thyme and other aromatic plants grow ſpontaneouſly, and which is not otherwiſe bare, but interſperſed with trees for ſhade. Yet the change of air in travelling, after

being accuſtomed to it, is healthy: whence many travellers have proved long lived; as, indeed, have alſo ſuch as have dwelt conſtantly in the ſame cottage. A ruddy complexion, clear white of the eye, quick hearing, and diſtinct voice, are ſet down by Palladius, as marks of the healthfulneſs of the place where theſe circumſtances are met with in the generality of its inhabitants.

The antients are particularly attentive to the quality of their water, and to the eaſe of coming at it. They adviſed bringing into the farm-houſe the warer of a ſpring which never dries up; or, if there be no ſuch ſpring within the farm, to bring running water as near to it as may be; or to dig for well-water, not of a bitter or brackiſh taſte. If neither of theſe was to be found, they directed large ciſterns to be provided for men, and ponds for collecting and retaining rain-water for cattle. They eſteemed that running-water to be beſt for drinking, which had its ſource in a hill; ſpring, or well-water from a riſing ground, was deemed the next beſt: well-water in the bottom of a valley was held to be ſuſpicious; and marſhy or fenny-water, which creeps ſlowly on, was by them rightly looked upon as the worſt of all.

That water is known to be wholeſome, which has no mineral in it, is perfectly clear, has no taſte or ſmell, depoſits no ſlimy ſediment, leaves no ſpots, or incruſtatoin when boiled in copper or braſs veſſels, and which boils pulſe in a very little time. "Rain-water, ſays Sir Thomas Elliot in his Caſtle of Health, is the moſt ſubtile and pure of any other water. The next is that which iſſueth out of a ſpring facing the eaſt, and paſſeth ſwiftly among great ſtones and rocks. The third is of a clear river, which runneth on hard ſtones and pebbles. There be divers means to try which is the beſt water; for that which is lighteſt in poiſe or weight, is beſt; alſo that whereof cometh leaſt ſcum or froth when it doth boil; alſo that which will ſooneſt be hot. Moreover, dip linen cloths in ſundry waters, and afterwards lay them to dry; and that which is ſooneſt dry, the water wherein it was dipped, is moſt ſubtile."

As ſprings and well-water paſs through beds of ſand, gravel, or ſmall ſtones, theſe clear it of all impurities, unleſs there be mixed with them ſubſtances which are ſoluble in water. If any mineral is mixed with the water, it is unfit for the farmer's uſe. If it be hard, it is thereby rendered unfit for waſhing, and ſome other culinary uſes. This is the kind of water which gives fleſh boiled in it a red colour. But even the hardeſt water may be eaſily rendered perfectly ſoft, and fit for any uſe, by mixing with it a ſmall proportion of pot-aſh, fixed ſalt, or, for want of theſe, the aſhes of any burnt vegetbles.

The animal and vegetable ſubſtances which are mixed with ſtagnating water putrify, and taint that water. This taint is moſt effectually carried off by boiling, during which all the putrid particles evaporate: and whatever elſe remains in it will ſubſide when it is cold. It may likewiſe be much mended by having air forced through it by means of Dr. Hales's ventilator; or it may be corrected by mixing with it acids, ſuch as vinegar, juice of ſour fruits, ſpirit of nitre, vitriol, &c.

When there is neither running nor ſpring-water, artificial ſprings may be made in the manner thus pointed out by Lord Bacon, who does not indeed ſay that he had experienced it himſelf; but it has been repeatedly tried ſince his time, and found to anſwer very well: "Upon a hanging ground, where there is a quick fall of rain-water, lay a half trough of ſtone, of a good length, three or four feet deep in the ground, with one end upon the high ground, the other upon the low. Cover this trough with brakes, to a good thickneſs, caſt ſand upon the top of the brakes and you will ſee, after ſome ſhowers are paſt, the lower end of the trough run like a ſpring of water." This will continue for a long time after the rain is paſt, "as if, ſays that great philoſopher, the water did multiply itſelf upon the air, by the help of the coldneſs and condenſation of the earth and the conſort of the firſt water." A gentleman in France, whoſe manſion ſtood on a height far from any water, was adviſed to make a long ditch, about a fathom deep, in the neighbouring higher grounds, and to fill it with ſand; he did ſo, and it continued to bring a plentiful ſupply of water, for all domeſtic purpoſes.

M. de la Hire obſerves, in the Memoirs of the Academy of Sciences for the year 1703, that rain-water which has been purified by paſſing through clean ſands, and is afterwards collected in ſubterranean reſervoirs, will keep a long while without becoming putrid. He thinks this water the beſt that can be made uſe of, either for drinking, or for other economical purpoſes, becauſe it is not impregnated with any mineral, as ſpring waters ſometimes are. The only thing requiſite in the conſtruction of ſuch reſervoirs or ciſterns is, to have a place which will hold water, made of ſuch materials as will not communicate any bad quality to the water, which is to remain there a conſiderable time. The firſt water that falls from the roofs of houſes, when it begins to rain, ſhould be thrown away; as having ſerved only to waſh the roof, which, in dry weather, is always covered with dung of birds, and other filth. He rejects ſnow-water for the ſame reaſon; and likewiſe the water of rain brought by winds which paſs over places infected with ill ſmells, as large cities, ſinks, &c. He computes, that water enough for the uſe of any family runs off the roof of the houſe which is inhabited by that family.

The buildings on the farm ſhould be proportioned to the produce, eſpecially as to ſtore-rooms. The expence of building ſhould be ſuch, as that, in caſe of accidents, one, or at moſt, two years rent may repair them. The farm-houſe ſhould be ſomewhat elegant, to give pleaſure to its poſſeſſors, and, as Columella adds, to allure the wife to take delight in it. It ſhould be built on the moſt healthy ſpot of the farm, in a temperate air, ſuch as the middle of a hill commonly enjoys, where it is neither ſtifling in the ſummer, nor expoſed to the rage of winds and ſtorms in the winter. It may be ſeated near a quick running river, if the banks are high, and the channel clear of mud: but if the river is large, care muſt be taken to ſituate it ſo that the winds may carry off the vapours in ſummer, and the fogs in winter, which otherwiſe would prove hurtful to the health of men and cattle. The front of the houſe ſhould be turned from ſuch a river. In a healthy ſituation, a houſe ſhould front the ſouth-eaſt, which is ſhaded during the hotteſt part of the day in ſummer, and enjoys the morning ſun in winter. A houſe facing weſterly will have the morning fogs longer retained, and will be too much heated by the afternoon ſun. In an unhealthy ſituation, the front ſhould be turned toward the north.

In ſouthern climates, where the ſun is within a few degrees of being vertical in ſummer, and yet the country is ſubject

ſubject to ſevere cold in the winter, as is the caſe of ſome of our North American colonies, a ſouth front is rather convenient: for in the heat of ſummer, the ſun, being high, paſſes over the roof from the eaſt ſide to the weſt, and ſhines but little, or not at all, in at the front windows, and very weakly, becauſe obliquely, upon the front wall. But in the winter, being low, it ſhines full in at theſe windows, at a time when the cold renders its cheering preſence quite agreeable.

Places in this kingdom intended for defence, before the invention of cannon, were built either on riſing-grounds difficult of acceſs, or where they could eaſily be ſecured by moats filled with water. Villages and farm-houſes were moſt frequently built in vallies, that they might be ſheltered from ſtormy winds; or near brooks or rivers, for the conveniency of water. In general, every means have not been uſed to provide againſt the inconveniencies of theſe ſituations: though as Mr. Worlidge obſerves, "were we for the future but duly to obſerve the beſt ſituations of places, and the compleateſt methods of building, in ſuch houſes as may hereafter be raiſed, our England would in a few years appear a kingdom beſet and adorned with curious and admirable habitations, poſſeſſed by noble and ingenious inhabitants."

Houſes built on too lofty a ſituation are expoſed to the violence of the winter's ſtorms, and to the ſcorching drought of the ſummer: yet we too generally find them without the only ſhelter their ſituation admits of, which is wood. The reaſon of this ſeems to be, that the inhabitants, finding that trees do not thrive well when they are firſt planted on dry heights, are at once diſcouraged. But where the plants are fenced from nipping winds while young, and protected from cattle till they become ſtrong, ſuch ground would be found abundantly favourable to the growth of trees which delight in a dry ſoil. "Theſe, as Mr. Worlidge expreſſes it, would yield a cooling, refreſhing, ſweet, and healthy air and ſhade during the heat of ſummer, and very much break the cold winds and tempeſts from every quarter in winter."

One might be apt to think from the unhealthineſs of low and fenny countries, that moats full of water about houſes ſhould be prejudicial to health: yet many facts ſhew the contrary. In Numb. 310, of the Philoſophical Tranſactions, a particular inſtance is given of two pariſhes which were ſurrounded with a moraſs, and yet were very healthy. Many houſes ſurrounded with moats are drier than others in a ſeemingly better ſituation; for books and furniture are often leſs apt to grow mouldy in the former, than in the latter. Hence it would ſeem probable, that the unhealthineſs of low marſhy countries muſt ariſe, rather from the putrefaction of animals and vegetables in ſlow moving or ſtagnating waters, than from a too great moiſture of the air, occaſioned by the quantity of water evaporated. Of this Dr. Pringle gives a remarkable inſtance in his judicious and uſeful Treatiſe on the Diſeaſes of the Army, when he ſays: "Another cauſe of the moiſture and corruption of the air were the inundations made about the fortified towns ſince the commencement of the war; which were particularly noxious upon letting the water off in the beginning of the ſummer, after the preliminary articles of the peace were ſigned. For theſe grounds, which were once entirely covered, being now half drained and marſhy, filled the air with moiſt and putrid exhalations. The ſtates being made ſenſible of this, by the ſickneſs that raged at Breda, and the neighbouring villages, gave orders to let in the water again, and keep it penned up till winter."

All phyſical writers point out the great danger to which health is expoſed from a moiſt and warm air; eſpecially if it be attended with a putrid vapour. Too much care cannot therefore be taken to guard againſt both. The too great moiſture may probably be prevented by collecting all the waſte water into deep ditches or ponds. We frequently ſee that ponds which have no ſupply of water but from rain, retain water during a very dry ſummer, when, according to the uſual calculations of evaporations, the whole muſt have diſappeared in half the time; from whence it ſeems more than probable, that the quick evaporation of water, in ſome caſes, muſt ariſe from a heat reaching to, or affecting the earth under the water; and that, if care be taken to make the ditches or ponds ſo deep that the heat of the ſun ſhall not warm the earth at their bottom, the quantity evaporated will be but ſmall, and ſuch as will not be prejudicial to the health of the neighbouring inhabitants, if neither animal nor vegetative bodies are ſuffered to rot in them. The way to prevent this is by keeping the water free from graſs, or other impurities, which may give ſhelter to animals, whoſe rotting, as well as that of the graſs, or of thoſe impurities, communicates a putrid taint to the exhalations. It is in this caſe neceſſary, that the banks of ditches, or ponds, be ſloped as little as the ſtrength or ſtiffneſs of the earth will permit.

Though lofty and bleak ſituations are too often deſtitute of trees, villages built in vallies are as frequently too much crowded with them; which muſt be attended with the inconvenience of not having a free circulation of air, to carry off the moiſture ariſing from the earth, and perſpiring from ſo many trees. The antients would have built ſuch villages on riſing grounds, to avoid the too ſultry heat of the ſummer; or they would have preſerved a free circulation of the atmoſphere, to prevent the bad effects of a ſtagnating moiſt air.

On the firſt ſettlement of the Engliſh in North-America, they imitated our cuſtom of building in vallies, and near rivers: but experience ſoon taught them, that ſuch places are more ſubject to the ſuffocating ſultry heat of the ſummer, and, what they little expected, to a greater ſeverity of froſt in the winter, than riſing grounds generally are. We have been informed by one of the moſt curious and intelligent obſervers of the laws of nature of perhaps any man on that continent, that the cold there, in their hardeſt froſts, is found to be ſo ſevere in the vallies, to a certain height, as ſometimes to kill every tender vegetable, while thoſe on the higher grounds eſcape. This generally takes place to a regular determined height, above which the Americans now build their houſes. If we be allowed to offer a conjecture concerning the cauſe of this, we ſhould ſay, that the effect of the cold ſeems to be limitted to the height to which the great moiſture of the air ariſes at that ſeaſon. In the hard winter of 1739-40, the ſame happened in this kingdom, when the froſt was much leſs ſevere in its effect in the hilly countries, than in the low lands.

Dr. Pringle, in his excellent treatiſe before-mentioned, points out the diſadvantages of planting ſo many trees as there generally are in moſt parts of the Netherlands. The ſame practice may be as juſtly blamed in many of the flat moiſt countries in England, eſpecially where they border

on marſhes. Their ſpeedy growth tempts the inhabitants to plant, at the ſide of their ditches, willows and other trees, which delight in a moiſt ſoil; and theſe not only prevent a free circulation of air, but alſo perſpire a great deal of moiſture. Dr. Pringle confirms this by the following inſtances.

"At Eyndhoven, two battalions of the guards were quartered in the town, and the third lay without, in the peaſants houſes, all within the compaſs of a mile; yet, what was remarkable, this without the town had always three times more ſick in the returns, than either of the other two, notwithſtanding one of them had been very ſickly the year before in Zealand. Now, the height of the ground being alike in all, the difference in point of health could be aſcribed to nothing, but to the greater moiſture of the cottages; for in all other points, theſe corps were equal, as in diet, duty, and exerciſe. A ſimilar caſe occurred in the cantonment of a regiment of foot, whereof one company being quartered in houſes that ſtood upon a heath, enjoyed a tolerable degree of health, while the reſt that dwelt in a wood were remarkably ſickly. As a further proof how prejudicial it is to have the air confined by cloſe plantations in ſo moiſt a country, it was obſervable, that the Dutch camp at Gilſen, bordering on our cantonment, but lying on an open heath, preſerved a good ſhare of health, while we were at the worſt. It was not a little curious to obſerve, how the agues declined proportionably with the withering and falling of the leaf. At this time leſs moiſture aſcends, and by the ſhedding of the leaves villages come to be more open and perflated, and of courſe more dry and healthful. While the troops were very ſickly in Zealand, commodore Mitchel's ſquadron, which lay at this time at anchor in the channel, between South Beverland and the iſland of Walcheren, in both which places the diſtempers raged, was neither afflicted with fever or flux, but amidſt all that ſickneſs enjoyed perfect health: a proof that the moiſt and putrid air of the marſhes was diſſipated, or corrected, before it could reach them; and that a ſituation open to the winds is one of the beſt preſervatives againſt the maladies of a neighbouring low and marſhy country."

The drieſt ſpot in a low flat or fenny country ſhould be choſen for a dwelling place. Even where there is gravel or ſand on the ſurface, care ſhould be taken that the ſprings do not riſe high. Dr. Pringle points out the neceſſity of this caution, from what he obſerved in the lower parts of Brabant, "which is a barren ſand, where ſo little water is ſeen, that, at firſt ſight, the country is deemed dry and healthful: but the appearance is deceitful; for water is every where to be found at two or three feet from the ſurface: and in proportion to its diſtance from thence, the inhabitants are more or leſs free from diſeaſes."

Mr. Worlidge directs, that, in low moiſt grounds, cellars ſhould be made under the houſe, with good ceilings, or rather arched walls; for that this will conduce much to its dryneſs and healthfulneſs. The importance of rendering houſes dry appears in many inſtances mentioned by Dr. Pringle: but we ſhall give only that in his twelfth page. "One quarter of Ghent, called St. Peter's-hill, ſtands high above the reſt of the country; and in this the barracks, having drains and free air, were quite dry; ſo that the men who lay there enjoyed perfect health. But the reſt who were quartered in the low part of the town, where their barracks were moſtly the ground-floors of waſte houſes without drains, and of courſe very damp, were all ſickly."

The bed-chambers, in ſuch ſituation, more eſpecially, ſhould be in the drieſt and moſt elevated part of the houſe, and where the morning ſun may contribute moſt to keep them dry. If they are ſo ſituated, that the ſun does not warm and dry them, they ſhould be frequently aired with fires; the oftener in proportion to the greater dampneſs of the place: for this has been found to contribute greatly to the health of the inhabitants. We are informed by a gentleman who has experienced it in many inſtances, that, by this ſole precaution, he has preſerved ſeveral families from the ague, when that diſtemper was very epidemic in the neighbourhood. How much the dryneſs of bed-chambers contributes to health is confirmed by what Dr. Pringle obſerves to have happened at Bruges, where the ſoldiers that lay in the upper ſtories kept their health remarkably better than thoſe who were below on the ground floors.

As brick walls render houſes drier than thoſe of ſtone, and of a more equal warmth than plaiſtering, Mr. Worlidge directs, that, "where bricks can be had, the walls ſhould be built with them, as may be done with little coſt, if you raiſe firm and ſtrong columns at the corners of the houſe, and where it is neceſſary to ſupport the main beams. You may build theſe ſquare, and between them raiſe the walls with the ſame materials, and work them up together with the corners and columns, leaving one half of the extraordinary breadth of the column without, and the other within the walls, whereby you will ſave much charge in materials and workmanſhip, and yet your houſe will be firm and ſtrong."

We are too little attentive to the ſituation of houſes with regard to rivers; though a judicious choice in this muſt be of great conſequence to the health of the inhabitants. A quick flowing ſtream, with a clean channel and dry banks, will rather add to the beauty and healthineſs of a country: but oozy banks, over-run with reeds or other ſtrong coarſe graſs, ſhould be carefully avoided, as being a ſhelter to all manner of putrid filth, whence unſalutary vapours muſt ariſe. It is a general opinion, that it is ſafer to dwell on the north than on the ſouth-ſide of a river; but experience ſeems to prove the contrary, eſpecially in warm climates. Marſhes, which are ſometimes overflowed with ſalt water, are found to be more unwholſome than freſh water marſhes. Their neighbourhood ſhould, therefore, be carefully avoided.

The Romans were univerſally agreed, that it was much better to occupy a ſmall farm than a large one; and laid it down as a rule, that the farmer ought to be ſtronger than the farm; becauſe in the ſtruggle which will ariſe between them, if the farm be too ſtrong for the farmer, he muſt be ruined; that is, if the extent of the farm be ſuch that he cannot beſtow a due culture on every part of it, he muſt be a loſer: for, as Columella remarks, "it is certain, that a large tract of land, not rightly cultivated, will yield leſs than a ſmall ſpace well cultivated."

A judicious correſpondent of the editors of the Muſeum Ruſticum rightly obſerves, that the ſtocking of a farm is a point of great importance, and requires as much judgment and foreſight as any other point in huſbandry.

"The bad ſucceſs of great numbers, continues he, is owing to their not having a ſufficient ſum of money to begin

begin with, which inevitably involves them in difficulties, and reduces their profit on every article of their produce. Their farm is underſtocked; they ſell at a conſtant diſadvantage; their fields are not half cultivated; and in a ſhort ſeries of years, unleſs ſome lucky hit ſets them up, they grow poor, in ſpite of all poſſible induſtry, judgment, and application.

"Even a low and eaſy rent will ſeldom remedy the want of money at ſetting out.

"The want of judgment, in proportioning the quantity of each particular kind of ſtock to the quantity and nature of the lands of a farm, is alſo attended with great loſs.

"For inſtance if a farm requires four horſes, or two ploughs, and the farmer keeps only three, or a plough and a harrow, his field cannot be ſufficiently cultivated, even according to the ideas of culture common among farmers; and of courſe in a few years his lands muſt be in very bad order, to his great annual loſs.

"On the contrary, to overſtock himſelf with horſes, is to keep what will inevitably eat him out of houſe and home: expences attending them are very great, and if they are not kept conſtantly at work, their owner muſt neceſſarily loſe by them. But it will not be amiſs to explain myſelf more particularly on this head.

"I am ſpeaking at preſent of the practice of farmers, ſome of whom overſtock themſelves with horſes, without giving their lands extraordinary ſtirrings on that account. If a farm, which commonly requires three horſes, has four kept, and is conſequently ploughed and harrowed proportionably more, the farmer will be no loſer by his fourth horſe; but the caſe is very different when he is kept without being worked to the beſt advantage of the farm.

"It is not to be at once perceived how much is loſt by not having the number of horſes proportioned to the land; nor can this always be done.

"A farmer may find it neceſſary to keep four horſes, and when he has got them, it is a chance but he could perfectly well manage ſeveral fields more with them; and when a man has an opportunity of hiring additional fields, then ſhould his judgment come into play, to take no more than his old ſtock will manage to advantage, unleſs he has a ſum of money ready to make an addition to it.

"The ſame ill conſequences attend either over or underſtocking a farm with all other cattle: and it would be the farmer's advantage was he always to remember, that three beaſts, of any kind, well fed, pay better than four without their bellies full. On the contrary, not to keep the ſtock neceſſary, is to ſubmit to a conſtant loſs. Both theſe ſorts of conduct are frequently followed, to the great unprofitableneſs of farming.

"The proportion of the paſture and arable lands of a farm is of great conſequence towards the occupier's making a profit of his buſineſs.

"The unprofitable practice of ploughing up paſtures, and not laying them down again, which is ſo univerſal in this country among farmers, whenever their landlords will allow it, tends perpetually to impoveriſh them. They are all, to a man, mad after ploughed lands, and would willingly break up every acre of graſs in their farms.

"So general an opinion among them would make one think the practice really profitable; but the contrary appears beyond all contradiction to be the truth; I mean, according to the culture at preſent purſued in this country.

"Two thirds of the land of a farm in a rich country ſhould be graſs; and a little one had better all be ſo. The vaſt expences of the plough, without doubt, keep many farmers poor, who, if their farms were graſs, would not run half the hazard, and enjoy a much better income.

"Particular points of bad management, for want of ſenſe or knowledge, through ſlovenlineſs, idleneſs, or other obſtructions, to any profitable huſbandry, are not what I mean to ſpeak of here, ſince they are ſo very various, and ſo totally ruinous, that no reaſoning can be concluſive, unleſs all ſuch exceptions are made.

"The improper quantity of land in a farm is often againſt the farmer's profit.

"Very large tracks, of two or three thouſand acres, which are common in Norfolk, are too extenſive for one farm. It is impoſſible for one man to cultivate ſuch a quantity of land well: much of it muſt be neglected, and but little perfectly managed.

"Great profit indeed ariſes from moſt of theſe farms; but they take a very large ſum of money to ſtock and manage them properly.

"Very ſmall ones, unleſs the farmer does the whole buſineſs himſelf, are equally liable to objection. The medium, which is ever, in proportion, the moſt profitable, is that quantity of land which will admit of being ſtocked and farmed without the want either of any addition or diminution. What I mean is this:

"Let us ſuppoſe a farm to conſiſt of ſeventy acres of land, twenty of them graſs and the reſt arable, in a rich country, the land from ten to ſixteen and ſeventeen ſhillings *per* acre; the occupier muſt keep one ſervant, and if he does not work hard himſelf, one labourer all the year, beſides ſome additional help at buſy times.

"I know there are many ſlovenly men, who cultivate (if their management deſerves that name) ſuch farms with fewer hands than I have mentioned; but their conduct can be no rule to good farmers. Four horſes are alſo neceſſary for ſuch a farm.

"Now, for the ſame ſtanding expences of ſervants wages, horſes, &c. the ſame number of ploughs, harrows, tumbrils, waggons, &c. &c. one hundred acres, or better, might be farmed with the ſame proportional profit: in this caſe, therefore, the tenant of ſeventy acres loſes conſiderably for want of thirty or forty more. Indeed, we ſeldom meet with a farm nicely proportioned to the ſtock on it.

"There are many very evident reaſons why farming ſhould prove unprofitable to gentlemen who undertake to cultivate a part of their eſtates, whether for their amuſement or convenience, or, generally ſpeaking, even for profit.

"A very fine Norfolk farm, of a large extent of country, the rent exceeding low, and a gentleman willing to be at the expence of marling, in ſuch a caſe, there is no fear of a conſiderable profit, even without perpetual attention: but in common farms, in rich countries, no profit can ariſe to any gentleman that does not give the buſineſs conſtant attention, and deſcend to *minutiæ*; which may be too diſagreeable for him to ſubmit to.

"What I mean by profit, is not making the rent which

he might receive from the tenant without trouble, and without hazard; but that additional ſum which is the farmer's profit after his rent and all expences are paid. This is ſcarcely ever made by gentlemen, who farm either for convenience or amuſement; and, excepting graſs grounds, I am perſuaded they loſe conſiderably by keeping land in their hands. The plea of growing enough for family uſe of wheat, oats, &c. is a miſtaken one; they had better by far buy every article, than have any thing to do with the plough.

"When I am told that farming anſwers to gentlemen, who I know do not give the farmer's attention to the buſineſs, I never believe it, or, at leaſt, am perſuaded that no regular accounts are kept. It will not be difficult to produce ſome good reaſons for this incredulity.

"It ſhould be remembered, that the farms which gentlemen keep in their own hands are ſeldom above fifty, ſixty, ſeventy, or an hundred a year, and not often ſo much. It is no eaſy matter for a farmer, with induſtry, ſobriety, and application, to make above a rent profit in ſuch a farm; and I believe but ſeldom ſo much. This is, with every advantage of underſtanding his buſineſs, applying cloſe to it, and doing ſome work (if his farm is ſmall, a great deal) himſelf: how unlikely is it therefore that a gentleman, who may probably want theſe advantages, ſhould make near that profit, or, indeed, any at all!

"In the firſt place, a principal part of his buſineſs, his buying and ſelling, is tranſacted by his bailiff, or head ſervant, who muſt be paid for his trouble. He may be luckly enough to meet with an honeſt one; but I would never adviſe any one to let the profit of his farming depend on the honeſty of other people. Suſpicion, to the open generous mind, is irkſome and grating: but the farmer ſhould ſet out with the maxim of Deſcartes—to doubt of his very exiſtence, and ſuppoſe every man a knave till he finds him honeſt.

"But there are many inconveniencies, beſides theſe, in truſting to bailiffs.

"The gentleman we muſt certainly ſuppoſe to be ignorant of farming; and he is then, of courſe, in danger of having an ignorant ſervant, without the ability of detecting him. However, the ſingle expence of a bailiff, or a head ſervant, which are much the ſame, is too great to be kept conſtantly for a ſmall farm; and in their abſence the gentleman muſt depend on himſelf.

"This is palpably no dependence at all; for can it be expected that he will forego his diverſions, his excurſions of pleaſure, the company of his friends, the joys of ſociety, to attend to his farm? I could almoſt as ſoon believe, that his wife would renounce an opera or a ball for the pleaſure of dancing attendance on her butter and cheeſe in the dairy. The rural joys of romance are pretty much out of date now; and, alas! there is a great difference between the employment of a farmer's wife in England, and keeping ſheep in the plains of Arcadia.

"But to return:

"There are, even in a ſmall farm, a thouſand objects which require conſtant attendance.

"Cattle of no kind will thrive but in the maſter's eye: every variation of the ſeaſon to be remarked; the lucky moment for ploughing, harrowing, ſowing, reaping, &c. to be caught, and uſed with diligence and foreſight; fence for ever to be attended to; and, in ſhort, a million of other things, which require conſtant thought and endleſs application.

That ſingle article, the employment of labourers, will alone run away with the profit of the whole farm.

"But ſurely it appears plainly, from what I have ſaid, that the unprofitableneſs of farming is ſcarcely ever owing to the art itſelf, but to the miſtakes of thoſe who practiſe it.

"As I have been ſo particular in diſtinguiſhing ſeveral points by which the followers of it loſe, I ſhall now treſpaſs a little longer on your patience, and give my ſentiments on the cuſtom of gentlemen's farming, in other reſpects than that of profit, to thoſe who are not ſolicitous about it, and in relation to it, to thoſe whoſe fortunes will not allow an indifference to ſuch a point.

"It is ſcarcely poſſible for a gentleman to live in the country without finding many inconveniences in not keeping a team of farming horſes, with waggons, carts, &c. and other implements uſed in the buſineſs of huſbandry. While profit is not conſidered, there will flow a multitude of agreeable circumſtances from farming, which will have ſome relation to almoſt every particular of a country life.

"In reſpect of entertainment, what more rational, or more amuſing, than country buſineſs, without the anxiety of caring for profit! The public good calls loudly to all gentlemen to keep ſome land in their hands, that experiments may be made, and modes of agriculture purſued, different from the practice of the neighbourhood, for the farmers, at leaſt, to ſee that their own cuſtoms are not the only good ones, and that there are improvements to be made even on their practice.

"All the improvements and new inventions in agriculture come from gentlemen; ſcarcely one, that I ever heard of, is known to have been diſcovered by farmers.

"I do not wonder at this; for I think it is natural enough; but at the ſame time, it is a ſtrong reaſon for gentlemen's farming, whether they make profit by it or not. The extenſive uſe of manures, and introducing a garden culture into the field-huſbandry, were the effects, among a hundred other inſtances, of gentlemen's farming.

"But if the public good was not to be conſidered, yet the mere amuſement of farming to a gentleman of fortune, who has the leaſt taſte for country buſineſs, muſt plead warmly for its practice. Such farmers ſoon make a garden of their eſtates, at the ſame time that they improve the value of them.

"What can be more amuſing than experimental agriculture? trying the cultivation of the new-diſcovered vegetables, and all the modes of raiſing the old ones; bringing the earth to the fineſt pitch of fertility, and growing plants infinitely more vigorous and beautiful than any in the common tillage; uſing the variety of new machines perpetually invented, and obſerving their effects; and, in a ſmall extent of ground, ſee the growth of an infinite variety of vegetables, unknown in the common practice; perpetually enjoying the neatneſs of huſbandry, that *ſimplex munditiis* of farming, which gives the moſt beautiful colouring to every object around, and pleaſes the refined imagination with the enchanting proſpect of all the elegance of nature.

"Thoſe gentlemen of ſmall fortunes, who, if they practice any thing of farming, find it neceſſary not to be indifferent to profit, have many points to conſider.

"Such an one ſhould remember, that though a farm will afford amuſement, it will not yield profit without application. A conſtant attention to every article is highly

ly neceſſary. He ſhould keep the exacteſt accounts, and make memorandums of what knowledge he can pick up. For a few years he muſt employ a bailiff; and he will find that every day and hour will increaſe his own knowledge, if he is attentive to buſineſs." *Muſeum Ruſticum, vol.* IV. *page* 264.

We ſhall concude this article with the following "*Prices of Implements of Huſbandry, Corn, and Farming-Work, in the North Part of Hertfordſhire, about Hitchin, Baldock, and Stevenage.*

A waggon complete, from 16 to 20 l.

A cart complete, from 8 to 10 l.

A two-wheeled plough complete, with draught-chain, and ſplinter-bars, or wipple-trees, 3 l.

A wheat two wheeled ſowing-plough, as the ſame wheels ſerve for both, 1 l. 1 s. 6 d.

A ſoot, ſwing, or dray-plough complete, 1 l.

A roller complete, 15 s.

A five-barred harrow ditto, 17 s.

A four-barred harrow ditto, 15 s.

A three-barred harrow ditto, 12 s.

Firſt ploughing per acre, 6 s.

Second ploughing per acre, 5 s.

Harrowing per acre, 6 d.

Rolling per acre, 4 d.

Hoeing turnips per acre, 4 to 5 s.

Hockling, or cutting up and raking haulm, 2 s. 6 d. per acre.

A harveſt-man has per month from 33 to 40 s. and his diet.

A ploughman, for a day's work, 8 d.

A labourer, 1 s. per day, and ſmall beer.

Price of threſhing per quarter, wheat 2 s. barley 1 s. oats 9 d. peaſe 1 s. 4 d.

Price of horſes, from 5 to 15 l.

Price of cows, from 3 to 8 l.

Price of ſheep, from 10 to 20 s.

Hogs, from 5 to 40 s.

Wheat per load, 30 to 35 s. Five buſhels make a load, and eight loads, or forty buſhels, a waggon-load.

Barley, 24 s. per quarter.

Oats, 16 s. per quarter.

Peaſe, 17 s. per load.

Thetches, or vetches, 25 s. per load.

Malt, 4 s 6 d. per buſhel.

Note. Our buſhel is nine-gallon meaſure.

Turnip-ſeed, 3 d. per pound.

Red clover-ſeed, 4 d. per pound.

Trefoil-ſeed, 2 d. per pound.

Cinquefoil ſeed, 4 s. per buſhel.

Wheat-ſtraw, 10 s. per load.

Barley and oat-ſtraw, 6 s per load.

Cinquefoil-hay, per hundred, 2 s. 6 d.

Clover-hay, per hundred, 2 s. 6 d.

Thatching per ſquare, yelming and ſerving included, 2 s. 6 d.

A carpenter per day, 1 s. 8 d.

A bricklayer ditto, 1 s. 10 d.

Brick at the kiln, 17 s. per thouſand.

Plain tiles, 17 s. per thouſand.

Pan-tiles, 10 s. per hundred.

Lime, 6 d. per buſhel.

Tiling-lath, 2 s. 10 d per bunch.

Plaiſtering-lath, 1 s. 5 d. per bunch.

Hurdles per dozen, 8 s.

Faggots, from 6 to 16 s. per hundred.

Making, plaſhing, and laying live-hedges, and ditching, 4 d. per pole of ſixteen feet and a half." *Muſeum Ruſticum, vol.* IV. *page* 78.

FARM-YARD, the place adjoining to the farm-houſe, where cattle are foddered, and ſeveral other neceſſary works, belonging to the farm, are performed.

FARTHING-DALE, or *farding-dale*, the fourth part of an acre of land, now generally called a rood.

FATHOM, a long-meaſure containing ſix feet.

FEABES, or *feaberries*, gooſeberries.

FEBRIFUGE, having the power of curing fevers. *See* FEVERS.

FEBRUARY, the ſecond month of the year.

This is a principal ſeed month for ſuch as they commonly call lenten grain, and is uſually ſubject to much rain or ſnow, which is not unſeaſonable.

Now ſow all ſorts of grey peaſe, fitches, beans, and black oats: in dry weather carry out dung, and ſpread it before the plough, and alſo on paſture ground: this being the principal month for that purpoſe.

This is a very proper time for planting trees and quick-ſets, and alſo to plaſh them; to ſet willows, plants, or pitchers, and alſo poplars, oſiers, and other aquatics; and to lop trees, or cut coppices.

Sow muſtard-ſeed, and hemp-ſeed, if the ſpring prove mild: feed your ſwans, and make their neſts where the floods cannot reach them.

Soil ſuch meadows as you cannot overflow or water; catch moles, and take great care of ewes and lambs where they are forward. *Mortimer's Huſbandry, vol.* II. *pag.* 413.

FEED, the quantity of oats, &c. given to a horſe or other animal.

FEEDING *of cattle. See the article* CATTLE.

FEET, the baſes or ſupports of an animal.

The knowledge of the feet is of the utmoſt importance in purchaſing a horſe. Nor is it enough that the creature have a well-proportioned foot; for if it chance to be thin or weak, the buyer will be diſappointed in his expectations; as ſuch a foot is liable to be ſpoiled in ſhoeing, by travelling on hard ſtony ground, by too much drought in hot ſeaſons, or by too much moiſture in winter. A thin foot is that where the cruſt or horn is thin. This may be very eaſily ſeen when the ſhoe is taken off, becauſe the verge all round the ſole will appear thin, and where it is ſo a horſe will winch with the leaſt touch of the pincers. The heel and frog are alſo apt to be ſoft and tender to the touch, and by reaſon of the weakneſs natural to ſuch a kind of foot, it often turns awry, and one point of the heel ſtands higher than the other.

FELL, the ſkin or hide of a beaſt.

FELLING, the act of cutting or hewing down.

When any tree is intended to be cut down for timber, the firſt thing to be taken care of is a ſkilful diſbranching, or lopping off, ſuch limps, as may endanger it in its fall, many trees being annually ſpoiled for want of a previous care of this kind; and therefore in very large arms, chop a nick under them cloſe to the bole, and then meeting it with downright ſtrokes, it will be ſevered without ſplitting. Take care alſo to cut the tree as near the ground as poſſible, unleſs you deſign to grub them up, the doing of which will be of advantage both to the timber and to the wood; for timber is never ſo much valued, if it be known to grow out of old ſtocks.

M. de Buffon has very juſtly obſerved, that the trees intended to be felled for ſervice ſhould firſt be ſtripped round of their bark, and then ſuffered to ſtand and die upon the ſpot before they are cut. For by this means the ſappy part, or blea of the tree, becomes as hard and firm as the heart, and the real ſtrength and denſity of the wood has been proved, by many experiments, to be greatly increaſed by it.

FEN, a general name for boggy, mooriſh, or marſhy land, generally overflowed with water. *See the articles* BOG, DRAINING, MARSH, *and* MOOR.

FEN, is alſo the name of a very pernicious diſtemper to which hops are ſubject. It conſiſts of a quick growing mould, or moſs, which ſpreads itſelf with great rapidity, and occaſions dreadful ravages in the hop grounds. *See the article* HOPS.

FENCE, a hedge, wall, ditch, bank, or other incloſure, made round fields, woods, gardens, &c.

No foreſt trees ſhould be admitted into the hedges that divide fields, as their ſhade, and wide extending roots, are found very injurious to corn, graſs, and even to the hedge itſelf. But in countries where, inſtead of hedges, the fences are chiefly made of rough flakes of ſtone, piled dry every one upon another, or a little earth thrown in between them, to fill up the chaſms, a plantation of trees within theſe walls will hide their deformity, and give a warmth which cannot be expected from ſuch walls.

The moſt uſual way of incloſing land is with a ditch and a bank ſet with hawthorn, crabs, black thorn, holly, or white thorn, commonly called quick. Mr. Miller's inſtructions in this reſpect are very full, and contain among others, the following directions:

"It will be proper before planting to conſider the nature of the ſoil, and what ſorts of plants will thrive beſt in it; and alſo what the ſoil is from whence the plants are to be taken: for if the ground they are taken from better than that into which they are to be put, it will be more difficult to make them grow. Thoſe which have been raiſed on the ſpot near the place where they are intended to be ſet, will always do beſt, if they are to be tranſplanted; and the next to them will be ſuch as are taken from a nurſery.

"I would recommend the white thorn, the black thorn, and the crab for outward fences to good ground: but I do not approve of intermixing them.

"The white thorn is the beſt quick to plant, becauſe it is the moſt eaſily procured, is very hardy and durable, and may be rendered the cloſeſt of any fence, by proper clipping. It, therefore, is preferred to all others for outward fences, or for the diviſion of fields, where they are expoſed to cattle, &c. It may be raiſed either from ſets or from ſeeds. The former is the moſt common way of propogating it: for the latter, which may very properly be ſown where the hedge is intended to ſtand, do not riſe till the ſecond ſpring. The white thorn will thrive onan almoſt any well looſened ſoil, except the drieſt gravel or ſand.

"The black thorn and crab make very good fences, and are to be raiſed in the ſame manner as the white thorn: but if the kernels of apples or crabs be ſown, it is beſt to ſow the pomace with them; for they will then come up the ſooner, that is to ſay, the firſt year.

"The black thorn is not accounted ſo good for fences as the white thorn, becauſe it is apt to run more into the ground, and is leſs certain as to the growing: but, on the other hand, its buſhes are much better, and more laſting, than thoſe of the white thorn, or indeed any other ſhrub, for dead hedges, or to mend gaps: nor are they ſubject to be cropt by cattle, as the others are. The richer the mould is, the better the black thorn will proſper: but it will grow on the ſame ſort of ſoil as the white thorn.

"The holly makes an excellent fence, and is preferable to all the reſt; but it is difficult to be made to grow at firſt, and is a ſlow grower. However, when it does grow, it makes amends by its height, ſtrength, and thickneſs. It delights moſt in ſtrong ground: but will grow upon the drieſt gravel, even among rocks and ſtones. It is raiſed from ſets, or berries, like the hawes of the white thorn, and lies till the ſecond ſpring before they come up. Theſe two are beſt ſown in the place where they are intended to ſtand. They ſhould be well weeded, both before they come up, and afterwards, till they are grown to ſuch a ſize, as, of themſelves, to kill the weeds.

"French furze will make good hedges upon dry ſandy banks, where few other plants will grow: but they muſt be kept very clean at the bottom, and never ſuffered to grow too high: nor ſhould they be clipped either in dry weather, late in autumn, or early in the ſpring; becauſe the cutting of them at thoſe ſeaſons is apt to make them die in patches, which is irrecoverable; as no new ſhoots will here ever proceed from the old wood.

"Alder planted on a bank, the ſide of which is waſhed by a river or ſtream, will make an extraordinary fence, and preſerve the bank from being undermined by the water; becauſe the alder is continually putting forth from the lower roots ſuckers, which are of great advantage where the current of the water waſhes away the earth.

"If there is to be a ditch along the hedge, that ditch ſhould be at leaſt ſix feet wide at top, three feet deep, and only one foot and a half over at the bottom, that each ſide may have a proper ſlope: for where its ſides are dug too perpendicular, they are very apt to fall in after a hard froſt, or heavy rain; and if the ditch is made narrower than here directed, it will ſoon be choaked up in autumn, by the falling leaves, and the growth of weeds: nor will it be a ſufficient defence for the hedge againſt cattle.

"When the bank at the ſide of this ditch is to be planted with quicks, the ſets ought to be about as thick as a gooſe quill, and their tops ſhould be cut off within four or five inches of the ground. They ſhould be freſh taken up, ſtrait, ſmooth, and well rooted. Part of the turf taken off the ſurface of the ground where the ditch is to be dug, ſhould be laid, with the graſſy ſide downward, on the ſide of the ditch, where the bank is intended to be made, and ſome of the beſt mould ſhould be laid upon it, to bed the quick. The ſets of quick, prepared as before directed, are then to be laid upon that mould, a foot aſunder, with their cut ends ſomewhat ſloping upward. When this firſt row of quick is thus laid, it muſt be covered with mould; ſome of the remaining turf muſt then be laid upon that mould with the graſs ſide downward, as before; and more mould muſt afterwards be laid upon this turf. When the bank has, by theſe means, been raiſed about a foot high, a ſecond row of ſets ſhould be laid in the ſpaces between the lower quick, and with their ends turned the oppoſite way, in order to thicken the bottom of the hedge. Theſe are then to be covered the ſame manner as the former: the bank is to be topped with the bottom of the ditch: and a dry or dead hedge muſt be made on the other ſide, to defend the young plantation from cattle.

"To

" To make theſe dead hedges, ſtakes ſhould be driven into the looſe earth, ſo low as to reach the firm ground. They ſhould be about two feet and a half aſunder. Oak ſtakes are reckoned the beſt, and black thorn and ſallow the next. When they are fixed, ſmall buſhes ſhould be laid at the bottom, but not too thick; for that would make the buſhes rot. The upper part of the hedge ſhould be laid with long buſhes, to bind the ſtakes in, by interweaving them: and, to render this hedge yet ſtronger, it may be eddered as it is called, that is, the tops of the ſtakes may be bound in on each ſide, with ſlender long poles or ſticks. When this eddering is finiſhed, the ſtakes ſhould be driven anew; becauſe the doing of that, together with the weaving of the hedge, will probably have looſened them

" The quick muſt be kept conſtantly weeded, and ſecured from being cropped by cattle, and in February it ſhould be cut to within an inch of the ground; for this will make it ſhoot ſtrong, and greatly help its growth.

" When a hedge of this kind is about eight or nine years old, it will be proper to plaſh it; the beſt time for which is in October, or February.

" After it has ſtood twenty or thirty years, and there is in it old ſtubs, as well as new ſhoots, thoſe ſtubs ſhould be cut ſloping off within two or three inches of the ground, except the beſt and longeſt of the middle ſize, which ſhould be left to lay down, and ſome of the ſtrongeſt, which ſhould be cut off at the height of five or ſix feet, according to the intended height of the hedges. Theſe laſt may be left to ſerve inſtead of ſtakes, and freſh ſtakes ſhould be put wherever they are wanted. The hedge ſhould be thinned, ſo as to leave on the ſtubs only ſuch ſhoots as are deſigned to be of uſe, that there may be room left to put a ſpade in between them, in order to give the earth as good a ſtirring as poſſible. The ditch alſo ſhould be cleanſed, and its ſlopes carefully repaired; and where the earth has been waſhed from the roots of the quick, or is hollow, it ſhould be faced anew with ſo much of the firſt ſpit of earth as there is occaſion for: the ſecond ſpit of this earth ſhould be laid on the top of the bank: for if it be laid on the ſide, or face of the bank, it will ſlip again into the ditch when wet comes, and perhaps drag down a great deal of the bank.

" Two extremes are to be avoided in the plaſhing of quicks: the firſt is, the laying the plaſhes down too low, and too thick; becauſe that makes the ſap run wholly into the ſhoots, and leaves the plaſhes without nouriſhment, which, with the thickneſs of the hedge, kills them. The ſecond is, not to lay them too high; becauſe this draws all the ſap into the plaſhes, ſtints the ſhoots at the bottom, and renders the hedge ſo thin, that it will neither hinder cattle from going through, nor from cropping of it.

" When the ſhoot deſigned to be plaſhed is bent, give it a ſmall cut with a bill, half through, ſlanting a little downward; then weave it about the ſtakes, and trim off the ſmall ſuperfluous branches that ſtraggle too far out on either ſide of the hedge.

" If the ſtubs are very old, cut them quite down: ſecure the chaſms with a good dead hedge on each ſide, till the young ſhoots are got up tall enough to plaſh; and plant new ſets in the vacant ſpaces.

" If the bank for a fence be without a ditch, and it is intended to make a hedge of quicks, the ſets, prepared as before, ſhould be planted in two rows, almoſt perpendicular, at the diſtance of a foot from each other, in the quincunx order; ſo that in effect then will be only ſix inches aſunder." *Miller's Gard. Dict.*

When the plants of the thorn are themſelves ſtinted, or much decayed, as they generally are pretty ſoon, through the unmerciful wounds given them by unſkilful hedgers; inſtead of plaſhing them, the farmer's beſt way will be to dig them up, and plant young ſets in their ſtead. The only inconvenience attending this renewal is the expence of a dead hedge, which is not wanted in plaſhing: but I queſtion much, whether the healthineſs of the plants, when cut ſmooth, and in ſuch a manner as not to retain water, may not ſufficiently compenſate that charge. For the ſame reaſon, it ſeems to be moſt rational to cut the plaſhes upward; becauſe the wound will then be covered from the wet, at leaſt in ſome degree, by the ſlip which remains prominent over it.

Beſides the plants already mentioned for hedges, the ſweet-briar, or eglantine (dog-roſe) is thus recommended by a correſpondent of the ſociety of improvers in the knowledge of agriculture in Scotland, who had tried in vain, in that country, all the methods of fencing uſually practiſed in Hampſhire and Eſſex.

" Obſerving that no creature eat up or deſtroyed the ſweet-briar or eglantine (dog-roſe) I gathered the hips of this plant, and laid them in a tub till March: the ſeeds then rubbed out eaſily, and I ſowed them in ground prepared for garden-peas. By this means I got my crop of peas without prejudice to my briars, which came up the next year; and the year after, when they were about a foot high, I planted them in the following manner.

" After marking out my ditch, I laid my plants about eighteen inches aſunder, upon the ſide-graſs, and covered their roots with the firſt turfs that were taken off the ſurface of the intended ditch. The earth-ſide of theſe turfs was placed next to thoſe roots, and upon the turfs was laid other earth, taken out of the ditch, which I then finiſhed. In four or five years, theſe plants made a fence which no ſheep, cattle, or horſes could paſs. If old briars are dug up, and divided, they make excellent plants. Where the fences are thin, they may be eaſily thickened, by laying down branches; for theſe will make ſhoots of ſix or ſeven feet in a year. They bear clipping very well.

" In ſandy places, I ſeldom care to throw all the earth out of the ditch at once, but wait a year, till what I had thrown up is ſettled and ſwarded a little: then I raiſe my bank to the intended height. In the mean time nothing hurts my briars; and in two or three years after they have been planted, nothing can paſs the fence. Sheep ſometimes attempt it: but they ſoon are ſo entangled, that they would lie there till they die, if they were not taken out."

In the hedges which divide the farmer's fields only, fruit-trees may be planted; and theſe will yield profit, as well as ornament; or the fruit may be grafted upon a ſtock in the hedge, properly ſuited thereto.

Theſe ſtocks ſhould be pruned up every year, till they are brought out of the reach of cattle, and then they may be grafted with the red-ſtreak, gennet-moil, or any other fruit. If they have proceeded from apple-kernels, they may remain ungrafted, and will yield very good cyder-fruit: but then it will be longer before they bear. Alſo, if the leaf, ſhoot, and bud of a natural ſtock, promiſe more than common, a trial may be made, whether that ſtock will not perhaps produce a fine new fruit; and if it be not liked afterwards, it may then be grafted.

Mr.

Mr. Miller reckons the plants raiſed from the kernels of the ſmall wild crab much better for hedges, than thoſe which are raiſed from the kernels of any other ſort of apple; becauſe the former never ſhoot ſo ſtrong as the latter, and therefore may be better kept within the proper bounds of a hedge; and as they generally have more thorns upon them, they are better guarded againſt cattle.

Fences made in marſhy grounds require plants which delight in moiſt ſoils. Of this kind are, particularly, the black-alder, the willow, and the poplar: the birch-tree, and the aſh will likewiſe grow very well in ſuch places: but the firſt of theſe, viz. the alder, is reckoned the beſt and moſt profitable.

It likes a ſoil ſo moiſt as few other trees will thrive in, and is propagated either by layers, or planting of truncheons about three feet in length. The beſt time for planting theſe laſt is in February, or the beginning of March, when they ſhould be ſharpened at their larger end, and the ground ſhould be well looſened before they are thruſt into it, leſt the bark ſhould be torn off, which may occaſion their miſcarriage. They ſhould be ſet at leaſt two feet deep, to prevent their being blown out of the ground by violent winds, after they have made ſtrong ſhoots, and they ſhould be kept clear from all ſuch weeds as grow tall, at leaſt till they have got good heads; after this, they will keep down the weeds, and require no farther care.

If alders are raiſed by laying down the branches, this ſhould be performed in October, and by the ſame time twelvemonth they will have roots ſufficient to be tranſplanted, which muſt be done by digging a hole, and looſening the earth in the place where each plant is to ſtand. The young ſets muſt be planted at leaſt a foot and a half deep, and their top ſhould be cut off to within about nine inches of the ground; for this will make them ſhoot out many branches.

The alder tree may be trained into very thick cloſe hedges, to the height of twenty feet and upwards. It will thrive exceedingly on the ſides of brooks, for it grows beſt when part of its roots are in the water, and may, if planted there, as is uſual for willows, to be cut for poles every fifth or ſixth year. Its wood makes excellent pipes and ſtaves; for it will laſt a long time under ground, or in water: and it is likewiſe much eſteemed by turners, plough-wrights, &c. and for making ſeveral utenſils neceſſary in agriculture. Its bark yields a good black dye.

All the ſorts of willows, of which Mr. Miller enumerates fourteen, grow beſt in moiſt boggy land, and may be eaſily propagated by planting cuttings or ſets, either in the ſpring or autumn: for theſe readily take root, and are of quick growth.

In countries where there is great plenty of rough flat ſtones, the fences which bound an eſtate, or farm, are frequently made with them. It is a pretty common practice in Devonſhire and Cornwall, where they build as it were two walls with theſe ſtones laid one upon another, firſt two, and then one between; and as the walls riſe, they fill the intermediate ſpace with earth, beat the ſtones in flat to the ſides, which makes them lie very firm, and ſo proceed till the whole is brought to the intended height. They then plant upon theſe walls quick hedges, and even timber trees, which thrive exceedingly; and they eſteem theſe fences the beſt ſecurity that can be to their ground and cattle. However, if theſe ſtones are laid rough and dry, they cannot but be diſagreeable to the eye, and muſt certainly require frequent repairs, becauſe they will often be forced out of their places, or beaten down by cattle.

To prevent this, let ſuch walls be built in the bottom of a ditch, made wide enough for the purpoſe, and ſloped down on each ſide. The deformity will then be hid: and as the cattle cannot ſtand facing the wall, ſo as to attempt to leap over it, the ſtones of which it is compoſed will be the leſs liable to be beaten down. The earth taken out of the ditch may be ſpread on the adjacent ground, and its ſides may be planted with ſuch trees, or under-wood, as beſt ſuit the ſoil. If a ſpace of ſeveral feet proportioned to the demand which there may be for timber, is left on the inſide of the fence, it will be attended with every advantage ariſing from a ſupply of that neceſſary commodity; without prejudice to the arable or more valuable paſture.

Another very ſtrong and durable fence may be formed thus, in graſſy places. Dig pieces of turf, four or five inches thick, the breadth of your ſpade, and about a foot long. Lay theſe turfs even, by a line on one ſide, with the graſs outward, at the diſtance of ten or twelve inches within the mark at which the ditch, afterwards to be dug in the ſolid ground, is to begin. Then lay in the ſame manner, but with their graſs-ſides turned out the contrary way, another row of turfs, at ſuch diſtance as to make a breadth of foundation proportioned to the intended height of the bank. The reaſon for placing theſe turfs thus much within what is to be the edge of the ſolid ground dug away on each ſide, is to prevent the bank from falling in, if the ground underneath it ſhould be any way defective. A ditch, of what breadth or depth you pleaſe, may then be dug; or the ground may be lowered on each ſide with a ſlope; in which laſt caſe there will be no loſs of paſture by the fence, becauſe it may be ſowed with hay-ſeeds, and will bear graſs on both ſides. Part of the earth taken out of the ditches or ſlopes, will fill the chaſm between the rows of the turf, and the reſt may be ſcattered over the adjacent ground. Three, four, or more layers of turf may be thus placed upon one another, and the interval between them filled up as before, till the bank is brought to the deſired height; only obſerving to give each ſide of it a ſmall ſlope, for greater ſtrength. The top of this bank ſhould be about two feet and a half wide, and the whole of it ſhould be filled up with earth to a level with the turfs, excepting a little hollow in the middle, to retain ſome rain. Quick-ſets ſhould then be planted along this top, and they will ſoon form an admirable hedge. By this means, a bank four feet high, and a ſlope only two feet deep, will make, beſides the hedge, a fence ſix feet high, through which no cattle will be able to force their way: for the roots of the graſs will bind the turfs ſo together, that, in one year's time, it will become entirely ſolid, not a joining will appear, nor a turf can be got out; and it will be yet much ſtronger, when the roots of the quick ſhall have ſhot out among it. The only precautions neceſſary to be obſerved here, are, firſt, not to make this bank when the ground is too dry; becauſe, if a great deal of wet ſhould ſuddenly follow, it will ſwell the earth ſo much, as, perhaps, to endanger the falling of ſome of the outſide, which, however, is eaſily remedied if it ſhould happen; and, ſecondly, if the ſlope be ſuch as ſheep can climb up, to ſecure the young quicks at the time of planting

planting them, by a ſmall dead hedge, either on or near the top on both ſides. If any of the quicks ſhould die, which they will hardly be more apt to do here than elſewhere, unleſs, perhaps, in extreme dry ſeaſons, they may be renewed, as in other places, by planting new ones, or by layers from thoſe which remain.

A fence like this will even do for a park; eſpecially if poſts and rails, about two feet high, are placed a little ſloping over the ſide of the bank, on or near its top: for no deer will be able to jump over this, nor can they creep through it.

This is one of the beſt fences to afford ſhelter for cattle; and if the quick on the bank is kept well clipped, it will form a kind of green wall, pleaſing to the eye.

When the bounding fence is only to guard againſt accidents from without, it may be made in the ha-ha manner; only taking care that the earth be ſo well rammed down at the back of the wall, as that the ſtones may be properly ſupported, and bear equally.

The ingenious author of the Eſſays on Huſbandry recommends the horn-beam plant, as one of the beſt yet known for making fences, according to the method uſed in Germany, where ſuch fences are common.

"When the German huſbandman, ſays he, erects a fence of this nature, he throws up a parapet of earth, with a ditch on each ſide, and plants his horn-beam ſets in ſuch a manner, as that every two plants may be brought to interſect each other, in the form of St. Andrew's croſs. In that part where the two plants croſs each other, he gently ſcrapes off the bark, and binds them with ſtraw thwart-wiſe. Here the two plants conſolidate in a kind of indiſſoluble knot, and puſh from thence horizontal ſlanting ſhoots, which form a ſort of living paliſado, or *chevaux de friſe*; ſo that ſuch a protection may be called a rural fortification. The hedges, being pruned annually, and with diſcretion, will, in a few years, render the fence impenetrable in every part. *Eſſays on Huſbandry, eſſay* I. *page* 14.

FENNEL, the name of a well known plant cultivated in kitchen gardens. It is propagated by the ſeeds, which ripen in autumn, and ſhould be ſown ſoon after. They will come up in the ſpring, and require no other care than to keep them clean from weeds. This plant will grow in any ſoil or ſituation.

FENNY, mooriſh, marſhy, boggy.

FENNY-LAND. *See the articles* BOG MARSH, *and* MOOR.

FERMENT, the ſubſtance uſed to raiſe a fermentation, as yeaſt, wine, lees, leven, &c.

FERMENTATION, an inteſtine motion excited in vegetable ſubſtances, whereby the coheſion of their parts are deſtroyed, and may eaſily be ſeparated from one another.

In every fermenting liquor, an inteſtine motion is generated in all its parts. It is called inteſtine, becauſe it is excited by the internal principles contained in the vegetable juices; for vegetable juices or infuſions made in water, however bright at firſt, and apparently homogeneous, on being kept in a moderately warm place, in veſſels not cloſely ſtopped, become turbid, conceive an inteſtine motion, emit numerous air-bubbles, and diſcharge a pungent vapour of extreme ſubtilty.

All bodies which may be ſo changed by this inteſtine motion, as to produce wine, are ſaid to be fermentable: and as this was never found to happen in any other than vegetable ſubſtances, vegetables alone are ſaid to be fermentable.

The fermentable claſs of vegetables are extremely various, and might be diſtributed into as many claſſes, as they require different methods of fermenting. We ſhall, however, mention them no further than they relate to the pleaſure and profit of the huſbandman.

The firſt claſs of fermentable ſubſtances includes all the pulpous ſummer fruits, which, when ripe, abound with a tartiſh ſweet juice; ſuch as grapes, apples, pears, elderberries, gooſberries, raſberries, currants, cherries, plums, and all other ſummer fruits, provided they be kept free from a tendency to putrefaction.

The ſecond claſs contains the freſh expreſſed and native juice of plants, provided they be of a tartiſh and ſweetiſh taſte; ſuch as the juice of the ſugar-cane, of liquorice, and other ſimilar plants. To this claſs may be added all the juices which diſtil from certain trees when wounded, eſpecially in the ſpring; as the birch, the plane or maple, the vine, the walnut-tree, &c. The maple has this remarkable property, both in the ſmall kind and in the great, which is called the ſycamore, that, being tapped, it will bleed freely in the winter, and its juice will flow very plentifully even after a hard froſt. All theſe juices generally run into a ſpontaneous fermentation.

The third claſs compriſes thoſe vegetable juices which are formed and inſpiſſated by nature into a certain ſaponaceous ſubſtance, conſiſting of ſaline and oily particles; ſuch as honey, manna, and all other juices which are not gummy or unctuous.

The fourth claſs comprehends all thoſe ſeeds which, when ripe and dry, may be ground into a fine meal, without their forming an unctuous paſte; ſuch are barley, wheat, oats, rye, &c.

Certain phyſical circumſtances are requiſite to render theſe different ſubſtances fit for fermentation; namely, firſt, a perfect degree of maturity ſuitable to each kind. All ſeeds and fruits which are ſo perfect, as, when ſown in fertile ground at a proper ſeaſon, and in a proper climate, to produce a plant of their own ſpecies, are fit for this operation. Another requiſite to fermentation is a moderate proportion of oil: for though fat ſubjects are more apt to grow rancid, than to ferment, yet if they are entirely deprived of their oils, they are hereby alſo rendered unfit for fermentation. Thus, bruiſed almonds, which are rich in oil, will ſcarcely ferment; but they may be ſo far freed from their oil by art, as to be made fitter for this purpoſe. Solubility in water is a third and principal requiſite in fermentable ſubjects.

The methods of preparing each fermentable ſubſtance for fermentation will be given under the articles *Wine*, *Cyder*, and *Beer*.

The juices of ſummer fruits are, of their own nature, greatly diſpoſed to ferment, ſo as immediately to begin this operation, without the addition of any other ferment. Other liquors may, however, ſtand in need of the help of other ferments, to begin this inteſtine motion, which, under proper conduct, proceeds afterwards of itſelf. The chief of theſe ferments is the recent flowers, commonly called yeaſt, thrown up to the top of beer in the act of fermentation: for if this rarefied frothy matter be mixed with other fermentable liquors, it greatly promotes their fermentation. The ſame matter become heavier, and ſunk to the bottom, provided it be not too ſtale, ſtill retains

the ſame vigour, though in a leſs degree than its former ſtate. The remains of former fermenting liquors ſticking to the ſides of caſks, have the ſame effect: for caſks thoroughly penetrated by the ſubtilty of wines which they formerly contained, are extremely apt to raiſe a violent and quick fermentation in the freſh liquors put into them. Acid paſte of flour fermented, or bakers leaven, may all be employed for the ſame purpoſe: for though meal may be preſerved freſh and ſweet during years, if it be kept in a dry ſtate, and perfectly free from inſects; yet if it be wrought with water into a ſoft cloſe paſte, and lightly covered in a warm place, it will ſoon begin to heave, be all over full of cavities, change its ſmell, colour, and tenacity, prove acid both to taſte and ſmell; and thus become that proper ferment from which the whole of this operation firſt took its name. When thus prepared, if part of it be mixed with other paſte, freſh and not yet fermented, it will cauſe this to ferment much ſooner, and more ſtrongly, than it would otherwiſe do. Hence, we need not be ſolicitous about a firſt ferment, becauſe nature affords it ſpontaneouſly every where. The great promoters of all the ſtages of this proceſs are warmth, a moderate admiſſion of air, and the addition of actually fermenting matter.

If we take large glaſs bodies, place them upright where they may be kept in an equal heat, and then fill each of them three quarters full with a crude fermentable liquor well prepared for the operation, the orifice being ſlightly covered with a cloth, and a heat kept up to above ſixty degrees, it will be pleaſing to obſerve the ſeveral degrees of fermentation.

The maſs, at firſt reſting, and poſſeſſing a certain ſpace in the veſſel, gradually begins to ſwell, rarefy, and conceive an inteſtine motion through its whole body, acting upwards, downwards, and ſide-ways, in ſtrange circumvolutions, without ceaſing, though with a different force. In the mean time bubbles are every moment formed in every part of the maſs, and conſtantly endeavour to riſe up to the ſurface, where they burſt with a hiſſing noiſe, or often break in the mid-way. Hence the whole maſs froths, diſcharging with an audible ebullition a certain tartiſh ſpirit, which proves acrimonious to the noſe, ſurpriſingly elaſtic, and capable of burſting almoſt any veſſel by its great expanſive force. If a large veſſel full of fermenting muſt, in the height of its action, ſhould diſcharge this condenſed ſpirit through a ſmall orifice, and a ſtrong healthy man ſhould draw in at his noſtrils the vapour ſo iſſuing, he would inſtantly fall down dead; or if he received but little thereof, he would become apoplectic, and remain an ideot his whole life. When this vapour is confined and accumulated in cloſe rooms, it will extinguiſh fire, and ſuffocate animals. Its producing the firſt of theſe effects is a ſign that it is collected in ſufficient quantity to cauſe the other. While candles continue to burn, we need not be afraid that this wild gaſs, as Helmont calls it, will be dangerous to life. It is on account of this ſpirit, that people are obliged to air wine-vaults, where wines are fermenting in the vintage ſeaſon, by ſetting open the windows, lighting fires, and letting in the wind.

In the progreſs of fermentation, the groſſer parts of the maſs begin to riſe to the top, and ſeparate there from the other liquor below, ſo as to collect into a ſpungy cruſt, which exactly covers the liquor underneath, and keeps in the more active parts thereof, in ſuch manner as to prevent their being exhaled and diſſipated before they have performed their effect. Now, it is curious to obſerve how great the agitation conſtantly is every where, even in the ſmalleſt part of the fluid matter, below this cruſt. A greater attrition can ſcarcely be conceived, than that which is here made with the utmoſt rapidity among all the particles. The cruſt being ſucceſſively broke, and raiſed up with a conſiderable noiſe, upon the returns of the exploſions, the exhalations eſcape, while the cruſt, preſently falling together, cloſes again, and prevents the active principles from exhaling otherwiſe. Thus, the formation and continuance of the cruſt is greatly aſſiſting in the due performance of fermentation.

As ſoon as all the groſs parts of the mixture are thus collected at the top, ſome leſs rarefied particles of the lower part of the cruſt, being no longer ſuſtained by the light bubbles which cauſed them to aſcend, begin to ſink thro' the fluid, and are agitated upwards and downwards by bubbles in and about themſelves, by means of which they are again raiſed to the top, from whence, upon the breaking of the bubbles there, they again fall downward; and when they have done this ſeveral times, they at length remain quiet at the bottom. After this, new little maſſes do the ſame; and after ſome continuance thereof, it frequently happens that all the upper cruſt, then grown heavier, or leſs rarefied, on account of the air diſcharged, ſinks of a ſudden downward, but ſoon after rolls upward, almoſt entire, with ſuch a force as would ſeem incredible, if it were not ſeen. When the upper cruſt is thus gradually conſumed and fallen to the bottom, the fermentation ceaſes, though the ſame degree of heat be continued; and the liquor, then floating over the fæces which remain at the bottom, becomes tranſparent.

So long as the cruſt remains at top, it is called the flowers of the fermenting liquor, and is the moſt proper and immediate ferment. What falls to the bottom is called lees.

The time requiſite for the perfect completing of fermentation can hardly be determined, becauſe it is different in different liquors, and depends much on the ſeaſon of the year, and heat of the weather. The juice of the palm-tree finiſhes its fermentation in a few hours in Africa; and this operation is likewiſe very ſoon ended in Aſia; but in the northern countries, it proceeds ſlower. In the heat of ſummer it proceeds quick, but in winter more languidly. It is, however, eaſy to know when the fermentation is finiſhed, viz. when the whole ſeries of the phenomena above deſcribed, has ſucceſſively appeared, and is at length ſpontaneouſly gone off. Then the veſſel ſhould be immediately ſtopped down, and the liquor ſhould be kept for ſome time on its lees, a great part of which will be aſſumed and aſſimilated by the liquor, which will thereby become ſtronger and richer in ſpirit than it was before. If the veſſel is not ſtopped down, the ſpirit produced in the fermented liquor will ſoon exhale, and leave behind only a vapid uſeleſs fluid; but if the liquor is kept quiet in a cloſe veſſel, it will gradually become more pure and ſpirituous. The ſweeter and richer the juice is, the longer does the fermentation continue, and the ſtronger and more ſpirituous is the wine or other liquor.

The diſtinguiſhing marks of a vinous liquor are as follow: it has the faculty of inebriating, or of altering the actions of the ſpirits and animal functions, by refreſhing, animating, and exhilerating the drinker: after this, it raiſes

raiſes the latent paſſions (*in vino veritas*;) and finally, it deſtroys the external and internal ſenſes and voluntary motions, and thus brings on a palſy, ſleep, or at laſt death.

Fermentation alſo changes the relaxing, ſaponaceous, cooling, and generally purging virtues of vegetable juices, into ſuch as are ſtrengthening, coagulating, and healing. Thus, the freſh infuſion of malt, before fermentation; ſolution of ſugar or honey in water, the freſh expreſſed juices of ripe ſummer-fruits, &c. when plentifully drank, prove flatulent, purgative, weakening, and cooling; but when properly fermented into beer, mead, or wine, they have quite contrary qualities, which they had not before. It is a very ſingular property of fermentation, that it produces from fermented liquor a ſpirit which is convertible into a liquid flame, and yet may be perfectly mixed with water.

The things which promote fermentation, or tend to the better performance thereof, are free admiſſion and emiſſion of air, a warmth between fifty and ſeventy degrees, and the addition of a proper ferment.

It is found that when the ſweet juices are boiled down to a thick conſiſtence, they not only do not ferment in that ſtate, but are not eaſily brought to ferment, when diluted with as much water as they had loſt in the evaporation. Juices and decoctions in general, which have ſuffered much fire, however ſweet, are little diſpoſed to ferment.

One of the chief checks given to fermentation, is the fumes of burning ſulphur, received in a large quantity at ſeveral times, and ſhut up along with the air remaining on the top of the fermenting liquor. If the whole caſk be penetrated and filled with the fumes of burning ſulphur before the fermenting liquor is put in, and if the empty part on the top of the liquor be afterwards well filled with the ſame, and the veſſel cautiouſly bunged down, the fermentation will certainly be ſtopped: and if, after ſome time, it ſhould begin again, from the prevalency of its own cauſe, it may again be ſuppreſſed by the ſame fumes. The ſame end is alſo obtained by mixing with the fermenting matter a large quantity of any powerful acid, ſuch as acid ſpirits of vitriol, or nitre; though theſe at the ſame time prove hurtful to the fermenting liquor. Alkaline ſalts likewiſe, if added in a large quantity to fermenting liquors, immediately excite an increaſe of effervеſcence, which preſently ceaſing, all farther fermentation is ſtopped. But here too fermenting liquor is ſpoiled, ſo that it can ſcarcely be brought again to ferment, though it may to putrefy. In the ſame manner, thoſe things which deſtroy acidity by drinking it up hinder fermentation. Thus, chalk, teſtaceous and calcarious ſubſtances, iron, lead, tin, have this effect. Stopping up the containing veſſels ſo cloſe, that nothing can eſcape or enter, will ſtop the fermentation, provided the veſſel be ſo ſtrong as not to be burſt by the force of the confined liquor. This is manifeſt in new malt liquors, which, when included in ſtrong bottles, well corked, effervеſce violently upon receiving the air. The extracting of the elaſtic air ſtops fermentation: too great heat rather diſſipates and throws off the active principles of fermentation, than excites and promotes them; and laſtly, too great a degree of cold likewiſe ſtops fermentation.

FERN, the name of one of the worſt of weeds, and one of the moſt difficult to deſtroy where it has a deep ſoil to root in. Mr. Mortimer ſays, he has ſeen its root eight or ten feet deep in ſome grounds; and adds, that the beſt way of killing it is by cutting it often while it is in graſs; that the moſt proper ſeaſons for this purpoſe are the Spring, Midſummer, and Michaelmas: that is, when the circulation of the ſap is ſtrongeſt. Moſt of the roots being then cut aſunder, and thereby deprived of the channels through which nature intended to convey the ſap, will bleed to death, or, if it ſtagnates in them, they will ſoon rot. The fern itſelf, if cut when full of ſap, and left to rot upon the ground, will greatly improve the ſoil, and mellow it ſo as to prevent its binding: or, if it be burnt when ſo cut, it will yield a much greater quantity of ſalt, than any other vegetable. If it be ploughed up, plentiful dunging of the land, and ſprinkling it well with aſhes, have been found to kill this weed: but the moſt certain cure for it is urine. In ſeveral parts of the North, where they keep their fern under, and deſtroy a great deal of it by mowing it frequently when green, they alſo find that rolling of it is of great ſervice; and when they burn it, the poor people make the aſhes of it up into balls, with a little water, dry them in the ſun, and uſe them in waſhing their linen, for which they think them nearly as good as ſoap. Often treading down theſe plants, and feeding Scotch ſheep on them, is ſaid to be almoſt an infallible way of killing the fern.

Trees planted among fern will thrive very much, though it be on a hot gravel; the fern ſhading their roots, and keeping them moiſt and cool.

FERTILE, *fruitful*, abundant, plenteous.

FERTILITY, fecundity, abundance, fruitfulneſs.

FESCUE, the name of a genus of graſs, of which there are ſeveral ſpecies; as the flote-feſcue, the ſheep's feſcue, &c. *See the articles* FLOTE-FESCUE, SHEEP'S FESCUE, &c.

FESTING-PENNY, earneſt given to ſervants when hired.

FETLOCK, the tuft of hair that grows behind the paſtern-joint of many horſes; thoſe of low ſize have ſcarce any ſuch tuft.

FETTERS, chains for the feet.

FEVER, a diſeaſe that frequently attacks ſeveral ſorts of cattle, particularly horſes.

The ſymptoms which denote the horſe to be afflicted with a fever, are great reſtleſſneſs, the creature ranging from one end of the rack to the other; his flanks beat; his eyes are red and inflamed; his tongue parched and dry; his breath hot, and of a ſtrong ſmell; he loſes his appetite, and nibbles his hay, but without chewing it, and is frequently ſmelling to the ground; the whole body is hotter than ordinary (though not parched, as in ſome inflammatory diſorders) he dungs often, little at a time, uſually hard, and in ſmall bits; he ſometimes ſtales with difficulty, and his urine is high coloured; he ſeems to thirſt, but drinks little at a time and often; his pulſe beats full and hard, to fifty ſtrokes and upwards in a minute

The firſt intention of cure is bleeding, to the quantity of two or three quarts, if the horſe is ſtrong and in good condition; then give him a pint of the following drink four times a day; or an ounce of nitre mixed up into a ball with honey, may be given thrice a day, inſtead of the drink, and waſhed down with three or four horns of any ſmall liquor.

Take of baum, ſage, and chamomile flowers, each a handful; liquorice-root ſliced, half an ounce; ſal prunel, or nitre, three ounces; infuſe the whole in two quarts of boiling water, and when cold ſtrain it off; then ſqueeze into it the juice of two or three lemons, ſweeten it with honey.

As the chief ingredient to be depended upon in the drink is the nitre, it may, perhaps, be as well given in water alone; but as a horſe's ſtomach is ſoon palled, and he requires palatable medicines, the other ingredients may in that reſpect have their uſe. Soleyſel for this purpoſe adviſes two ounces of ſalt of tartar, and one of ſal armoniac to be diſſolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley flower to qualify the unpleaſant taſte: this may be given every day, and is an uſeful medicine.

The following alſo may be given for this purpoſe:

Take Ruſſia pearl-aſhes one ounce, diſtilled vinegar one pint, ſpring-water two pints, honey four ounces; give a pint three or four times a day.

This neutral mixture, and the nitre drink above, may be taken alternately; they are both efficacious remedies, and in ſome caſes may properly enough be joined with the camphor drink.

His diet ſhould be ſcalded bran, given in ſmall quantities; which, if he refuſes, let him have dry bran ſprinkled with water: put a handful of picked hay into the rack, which a horſe will often eat, when he will touch nothing elſe: his water need not be much warmed, but ſhould be given often, and in ſmall quantities: his cloathing ſhould be moderate, too much heat and weight on a horſe being improper in a fever; which ſcarce ever goes off in critical ſweats (as thoſe in the human body terminate) but by ſtrong perſpiration.

If, in a day or two he begins to eat his bran, and pick a little hay, this method with good nurſing will anſwer; but if he refuſes to feed, more blood ſhould be taken away, and the drinks continued: to which may be added two or three drams of ſaffron, avoiding at this time all hotter medicines: the following clyſter ſhould be given, which may be repeated every day, eſpecially if his dung is knotty and dry.

Take two handfuls of marſhmallows, and one of chamomile flowers; fennel-ſeed an ounce; boil in three quarts of water to two, ſtrain off, and add four ounces of treacle, and a pint of linſeed oil, or any common oil.

Two quarts of water-gruel, fat broth, or pot-liquor, with the treacle and oil, will anſwer this purpoſe; to which may be added a handful of ſalt. Theſe ſort of clyſters are properer than thoſe with purging ingredients.

The following opening drink is very effectual in theſe fevers, and may be given every other day, when the clyſters ſhould be omitted; but the nitre balls or drink may be continued, except on thoſe days theſe are taken.

Take of cream of tartar and Glauber's-ſalts, each four ounces; diſſolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jallap, to quicken the operation in ſome horſes.

Four ounces of Glauber-ſalts or cream of tartar, with the ſame quantity of lenitive electuary, may be given for the ſame purpoſe, if the former ſhould not open the body ſufficiently.

In four or five days the horſe generally begins to pick his hay, and has a ſeeming reliſh to food: though his flanks will heave pretty much for a fortnight; yet the temper of his body, and return of appetite, ſhew that nothing more is requiſite to complete his recovery, than walking him abroad in the air, and allowing plenty of clean litter to reſt him in the ſtable.

This method of treating a fever is ſimple, according to the laws of nature; and is confirmed by long experience to be far preferable to the hot method.

The intention here is to leſſen the quantity of blood, promote the ſecretions of urine and perſpiration, and cool and dilute the fluids in general.

How far vinous cordials, ſtrong beer drinks loaded with fiery powders, and ſuch methods are likely to anſwer theſe purpoſes, is ſubmitted to the judicious obſerver; as alſo whether adopting the cool one in its ſtead is not as real an improvement in farriery as phyſic.

There is another ſort of fever that horſes are ſubject to, of a more complicated and irregular nature than the former, which, if not properly treated, often proves fatal.

The ſigns are a ſlow fever with languiſhing, and great depreſſions; the horſe is ſometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moiſt and languid; he has a continual moiſture in his mouth, which is the reaſon he ſeldom cares to drink, and when he does, it is but a little at a time. He feeds but little, and leaves off as ſoon as he has eat a mouthful or two; he moves his jaws in a feeble looſe manner, with an unpleaſant grating of his teeth; his body is commonly open; his dung ſoft and moiſt, but ſeldom greaſy; his ſtaling is often irregular, ſometimes little, at other times profuſe, ſeldom high-coloured, but rather pale, with little or no ſediment.

When a horſe's appetite declines daily, till he refuſes all meat, it is a bad ſign. When the fever doth not diminiſh, or keep at a ſtand, but increaſes, the caſe is then dangerous. But when it ſenſibly abates, and his mouth grows drier, the grating of his teeth ceaſes, his appetite mends, and he takes to lay down (which perhaps he has not done for a fortnight) theſe are promiſing ſigns. A horſe in theſe fevers always runs at the noſe, but not the kindly white diſcharge, as in the breaking of a cold, but of a reddiſh or greeniſh duſky colour, and of a conſiſtence like glue, and ſticks like turpentine to the hair on the inſide of his noſtrils. If this turns to a gleet of clear thin water, the horſe's hide keeps open, and he mends in his appetite; theſe are certain ſigns of recovery.

The various and irregular ſymptoms that attend this ſlow fever, require great ſkill to direct the cure, and more knowledge of the ſymptoms of horſes diſeaſes than the generality of gentlemen are acquainted with. The experienced farrier ſhould therefore be conſulted and attended to, in regard to the ſymptoms; but very ſeldom as to the application of the remedy, which is generally above their comprehenſion; though it may be readily ſelected, by duly attending to the obſervations here inculcated.

Firſt then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his ſtrength, fullneſs, inward ſoreneſs, cough, or any tendency to inflammation. After this, the fever drink

drink may be given, with the addition of an ounce of ſnake root, and three drams of ſaffron and camphor, diſſolved firſt in a little ſpirit of wine; the quantity of the nitre may be leſſened, and theſe increaſed, as the ſymptoms indicate.

The diet ſhould be regular; no oats given, but ſcalded, or raw bran ſprinkled; the beſt flavoured hay ſhould be given by handfuls, and often by hand, as the horſe ſometimes cannot lift up his head to the rack.

As drinking is ſo abſolutely neceſſary to dilute the blood, if the horſe refuſes to drink freely of warm water or gruel, he muſt be indulged with having the chill only taken off, by ſtanding in the ſtable; nor will any inconvenience enſue, but oftener an advantage; for the nauſeous warmth of water, forced on horſes for a time, pall their ſtomachs, and takes away their appetites, which the cold water generally reſtores.

Should the fever after this treatment increaſe, the horſe feed little, ſtale often, his urine being thin and pale, and his dung ſometimes looſe, and at other times hard, ſhould the moiſture in his mouth continue, his ſkin being ſometimes dry, and at others moiſt, with his coat looking ſtaring, and ſurfeited; upon theſe irregular ſymptoms, which denote great danger, give the following balls, or drink; for in theſe caſes there is no time to be loſt.

Take of contrayerva-root, myrrh, and ſnake-root powdered, each two drams, ſaffron one dram, mithridate or Venice treacle half an ounce, make into a ball with honey, which ſhould be given twice or thrice a day, with two or three horns of an infuſion of ſnake root, ſweetened with honey; to a pint and a half of which may be added, half a pint of treacle-water, or vinegar, which latter is a medicine of excellent uſe, in all kinds of inflammatory and putrid diſorders, either external or internal.

Should theſe balls not prove ſucceſsful, add to each a dram of camphor, and where it can be afforded, to a horſe of value, the ſame quantity of caſtor. Or the following drink may be ſubſtituted in their ſtead for ſome days:

Take of contrayerva and ſnake-root, of each two ounces, liquorice-root ſliced one ounce, ſaffron two drams; infuſe in two quarts of boiling water cloſe covered for two hours, ſtrain off, and add half a pint of diſtilled vinegar, four ounces of ſpirit of wine, wherein half an ounce of camphor is diſſolved, and two ounces of mithridate or Venice treacle; give a pint of this drink every four, ſix, or eight hours.

A more ſimple drink, and perhaps full as efficacious may be thus prepared:

Take camphor one dram diſſolved in rectified ſpirit of wine one ounce, then gradually pour on a pint of diſtilled vinegar warmed, and give for two doſes. The quantity of camphor may be increaſed.

Should the horſe be coſtive, recourſe muſt be had to clyſters, or the opening drink: ſhould he purge, take care not to ſuppreſs it, if moderate; but if, by continuance, the horſe grows feeble, add diaſcordium to his drinks, inſtead of the mithridate, if it increaſes, give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine, in theſe kinds of putrid fevers; being both active and attenuating, and particularly calculated to promote ſecretions of urine and perſpiration. It has been long celebrated in malignant fevers, as it gives motion to ſtagnant humours, in the moſt diſtant parts, and promotes their expulſion by the common outlets; nitre may be advantageouſly joined with it in many caſes. Theſe are the medicines that are chiefly to be depended on in putrid and epidemic fevers, where the circulation is ſlow and languid, the blood and juices tending to coagulate, putrefy, and run into grumes.

A horſe ſhould drink plentifully to promote the operation of theſe medicines; but inſtead of them, to a horſe of ſmall value, give an ounce of diapente, half an ounce of mithridate, and one dram of camphor, with a ſtrong infuſion of rue, ſcordium, and ſnake-root, in the manner as above directed.

Regard ſhould alſo be had to his ſtaling; which, if in too great quantities, ſo as manifeſtly to depreſs his ſpirits, ſhould be controuled by proper reſtringents, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiſs this way, and ſtales ſo little as to occaſion a fullneſs, and ſwelling of his body and legs, recourſe may be had to the following drink.

Take of ſal-prunella, or nitre, one ounce; juniper-berries, and Venice turpentine, of each half an ounce; make into a ball with oil of amber.

Give him two or three of theſe balls, at proper intervals, with a decoction of marſhmallows, ſweetened with honey.

But if, notwithſtanding the method we have laid down, a greeniſh or reddiſh gleet is diſcharged from his noſtrils, with a frequent ſneezing; if he continues to loſe his fleſh, and becomes hide-bound; if he altogether forſakes his meat, and daily grows weaker; if he ſwells about the joints and his eyes look fixed and dead; if the kernels under his jaw ſwell, and feel looſe; if his tail is raiſed and quivers; if his breath ſmells ſtrong, and a purging enſues, with a diſcharge of fætid, dark coloured matter, his caſe may then be looked on as deſperate, and all future attempts to ſave him will be fruitleſs.

The ſigns of a horſe's recovery are known by his hide's keeping open, and his ſkin feeling kindly; his ears and feet will be of a moderate warmth, his eyes briſk and lively; his noſe grows clean and dry; his appetite mends; he lays down well, and both ſtales and dungs regularly.

Be careful not to over feed him on his recovery; let his diet be light, feeds ſmall, and increaſed by degrees as he gets ſtrength; for by overfeeding, horſes have frequent relapſes, or great ſurfeits, which are always difficult of cure.

This is the moſt ſucceſsful method of treating theſe irregular, malignant fevers; where it is evident, by the various efforts nature makes to relieve herſelf, ſhe wants aſſiſtance, and a ſpur to quicken her motions. For by the uſe of theſe warm medicines, a criſis, or termination of the diſeaſe is quickened and promoted, as appears by the alteration made both in the urine and ſkin; the former of which, by its thickneſs, ſhews ſigns of concoction, as it is called, or of a ſeparation of the feveriſh matter from the blood; and the latter by its ſmoothneſs and gloſſineſs

gloſſineſs proves that a regular and free perſpiration is obtained: theſe two ſecretions are of ſuch importance to the welfare of every animal, that the neceſſity of rectifying them, when diſordered, is obvious from the conſequences.

If this fever ſhould be brought to intermit, or prove of the intermitting kind, immediately after the fit is over, give an ounce of jeſuits-bark, and repeat it every ſix hours, till the horſe has taken four or ſix ounces; ſhould eruptions or ſwellings appear, they ought to be encouraged, for they are good ſymptoms at the decline of a fever, denote a termination of the diſtemper, and that no further medicines are wanted.

The true reaſons perhaps why ſo many horſes miſcarry in fevers, are, that their maſters, or doctors, will not wait with patience, and let nature have fair play: that they generally neglect bleeding ſufficiently at firſt; and are conſtantly forcing down ſugar-ſops, or other food in a horn, as if a horſe muſt be ſtarved in a few days, if he did not eat: then they ply him twice or thrice a day with hot medicines and ſpirituous drinks, which (excepting a very few caſes) muſt be extremely pernicious to a horſe, whoſe diet is naturally ſimple, and whoſe ſtomach and blood, unaccuſtomed to ſuch heating medicines, muſt be greatly injured, and without doubt are often inflamed by ſuch treatment.

From the experience we lately had of the epidemic cold and fever among our horſes, and from the obſervations of others in the years 1732 and 1734, it evidently appeared that the ſimpleſt method of treatment ſucceeded beſt. Thus it is proper to bleed largely at firſt, to the quantity of three quarts, if the horſe is full and ſtrong: and if it appears that his lungs are not relieved by it, but continue ſtuffed and loaded, the bleeding ſhould be repeated; and a rowel may be put in his cheſt or belly.

Dilute the blood with plenty of water, or white drink; let his diet be warm bran maſhes, and his hay ſprinkled. Should the fever riſe, which will be known by the ſymptoms above deſcribed, give him an ounce of nitre thrice a day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a week; or an ounce of ſalt of tartar may be given every day, diſſolved in his water, for that purpoſe, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a day, with an infuſion of liquorice-root ſweetened with honey; to which may be added, when the phlegm is tough, or cough dry and huſky, a quarter of a pint of linſeed, or ſallad-oil, and the ſame quantity of oxymel ſquills.

As the kernels about the throat are greatly ſwelled in theſe caſes, I need not mention the neceſſity of keeping the head and throat warmer than ordinary, to promote a freer perſpiration, and forward the running at the noſe, which in a horſe anſwers the end of ſpitting, or expectoration in us: but the noſe ſhould never be ſyringed, as is ſometimes done, to promote this diſcharge, which it often checks, and occaſions bad ſwellings in the neighbouring parts and glands; for let it be remembered theſe are critical runnings of nature's own appointment, which by art may ſoon be fruſtrated. The following cooling purge is very proper to give at the decline of the diſtemper, and may be repeated three or four times.

Take two ounces of ſenna; anniſeed and fennel bruiſed, each half an ounce; ſalt of tartar three drams; let them infuſe two hours in a pint of boiling water; ſtrain off, and diſſolve in it three ounces of Glauber ſalt, and two of cream of tartar: give for a doſe in the morning.

This purge generally works before night very gently; and in fevers, and all inflammatory diſorders, is infinitely preferable to any other phyſic.

Before we cloſe this account of fevers, it may be no improper hint to the curious, to take notice that a horſe's pulſe ſhould more particularly be attended to than is cuſtomary, as a proper eſtimate may thereby be made both of the degree and violence of the fever preſent, by obſerving the rapidity of the blood's motion, and the force that the heart and arteries labour with, to propel it round. The higheſt calculation that has been made of the quickneſs of the pulſe in a healthy horſe, is, that it beats about forty ſtrokes in a minute; ſo that in proportion of the increaſe above this number, the fever is riſing, and if farther increaſed to above fifty, the fever is very high.

How often the pulſe beats in a minute may eaſily be diſcovered by meaſuring the time with a ſtop-watch, or minute ſand-glaſs, while your hand is laid on the horſe's near ſide, or your fingers on any artery; thoſe which run upon each ſide of the neck are generally to be ſeen beating, as well as felt a little above the cheſt. *Bartlet's Farriery, pag.* 31.

FEWEL, combuſtible matter; as fire, wood, coal, &c.

FIELD, a piece of ground encloſed, whether for tillage, or paſture.

FIELD *ſcabinus*, a perennial weed common among the corn. It is all over rough and hairy. The ſtalk is upright, and often a foot or a foot and a half high, ſpotted, and branching. The lower leaves are oval, and indented about the edges. Thoſe which grow on the ſtalk are divided, and of that ſort which botaniſts called pinnatifid. The flowers are blue, and of the compound kind, conſiſting of a conſiderable number of ſmall flowers, each divided into four parts, and having one ſeed under them. The taſte of the plant is a diſagreeable bitter.

FIG, the name given by farriers to a ſort of wart on the fruſh, and ſometimes all over the body of a horſe. The figs that appear on the fruſh or ſole, diſcharge a malignant ſtinking humour, which is very difficult to cure.

FIG-WORT, *pile-wort*, or *leſſer centaury*, a perennial weed common in paſture-grounds. The roots conſiſt of oblong knobs. The leaves are heart-ſhaped, cornered, and placed on foot-ſtalks. The flowers in general reſemble thoſe of the crowsfoot, but differ ſomewhat from them in having the cup divided into three parts only, the petals being about eight in number, and narrower. This low plant runs very much by the roots, and choaks all others which are near it.

FILLER, or *thiller* horſe, that faſtened immediately to the cart, and which ſupports the ſhafts.

FILLY, a female or mare colt.

FIMBLE-*hemp*, early ripe hemp.

FINE-BENT, the name of a very excellent ſpecies of graſs found in great plenty on the beſt ſheep paſtures.

We

We have given a figure of this graſs on Plate XV. Fig. 4. *See the article* GRASS.

FIRE-BLAST, an accident to which hops are very liable. *See the article* HOPS.

FIRE-BOTE, a quantity of fuel.

FIRING, an operation often performed on different parts of a horſe. It is done in the following manner: when the firing-iron is red hot, the farrier applies the thinneſt part to the horſe's ſkin, in one or more places, according to the nature of the diſeaſe.

Firing, or cauterizing, is often neceſſary after ſtrains and other accidents, which may occaſion a long continued weakneſs, or where there is a fullneſs, and the part is grown hard and callous, eſpecially about the joints, ſinews, and nervous parts, thoſe parts being compoſed of an infinite number of fibres and nervous threads, which lie ſo cloſe together, that nothing but what is of the moſt powerful nature is ſufficient to relieve them when obſtructed. This is performed in the moſt effectual manner, by burning the outſide, and giving vent to the incloſed matter to diſcharge itſelf; and ſometimes proves beneficial, when all other helps have been found ineffectual.

In firing about the ſinews and nervous parts, great care, is to be taken not go to too deep at firſt, but by gentle repeated razes or lines, till they come to a pale red colour; for if the fire once touches the ſinew, it will make the horſe go lame as long as he lives: the ſame ought to be drawn pretty cloſe together on each ſide the joints or ſinews, following the courſe of the hair, without making of croſs lines, which are of no uſe in theſe parts, and are only apt to diſfigure the horſe afterward.

When the more fleſhy parts, or an obſtinate humour, that cannot be brought to ſuppuration, requires firing, the ſkin ought to be pierced deeper, in order to draw away a ſufficient quantity of matter from the part; the ſame ought to be performed upwards, to prevent any ulcerous diſpoſition attending it: and in ſuch caſes little ſoft doſſils of tow, dipped in warm baſilicon, and ſpirit of wine, may be thruſt gently up into the orifices.

The firing inſtrument, or knife, ought to be ſomewhat rounded on the edge, and gradually thicker to the back, ſufficient to keep the heat of the fire for ſome time; the ſame ſhould be rubbed clean, that no dirt or aſhes may ſtick to it, and not uſed until the flaming redneſs is in part gone off. All the ſeared parts ought immediately to be bathed with ſpirits of wine, and where nothing elſe is requiſite to complete the cure, the place is only to be anointed with oil and bees-wax melted together. *Gibſon's Farriery, vol.* I. *pag.* 251.

FIRING IRON, a piece of iron about a foot long, one end of which is made flat, and forged like a knife, the back of it being half an inch thick, and the edge about the eighth of an inch.

FIR, a timber tree very common on mountainous and barren places, eſpecially in the colder climates. It differs from the pine in having ſingle leaves, which are, for the moſt part, produced on every ſide of the branches; whereas the pine has two or more leaves produced out of the ſheath or cover.

Fir trees are raiſed from ſeeds taken out of their polyſpermous cones. The way to get out the ſeeds is, either by expoſing the cones to a gentle fire, or by ſoaking them all night in water, which will cauſe their ſquamous cells to open, and readily emit their ſeeds. The former method is the beſt, provided they are not expoſed to too great heat. But this ought not to be done until you are ready to ſow them, which is beſt performed in the beginning of March.

Theſe plants ſhould be all raiſed in a nurſery, where they may be protected from the birds, otherwiſe they will be in danger of being deſtroyed, when they firſt come up: for as they bring up the huſk of the ſeed on the top of the plant, the birds in picking off the huſk will break off the plant, whereby a whole bed may be loſt in a few hours, if they are not carefully guarded from them.

The beſt time of ſowing theſe ſeeds is about the latter end of March, or the beginning of April, on a bed of light earth, covering the ſeeds about half an inch deep with the ſame ſort of earth. In this bed the plants ſhould remain until the following ſpring, when there ſhould be a number of beds prepared in the nurſery to receive theſe ſeedling plants; and the beginning of April they ſhould be tranſplanted into the beds, at the diſtance of ſix inches row from row, and at three inches aſunder in the rows. If the ſeaſon ſhould prove dry, it will be proper to water the plants every week once or twice, according to the warmth of the weather; and the beds ſhould be covered with mats, to ſcreen the plants from the ſun, and drying winds, until they have taken good root; after which time they require no farther care, but to keep them clear from weeds. In theſe beds the plants may remain two years; at the end of which they ſhould be tranſplanted into an open ſpot of ground, for their roots will in that time meet quite over the beds.

The diſtance which theſe plants ſhould be planted in this nurſery, ſhould be four feet row from row, and two feet aſunder in the rows.

When the plants are planted, if the ſeaſon ſhould prove dry, they ſhould be watered, to ſettle the earth to their roots; and if this is repeated three or four times, if the ſeaſon ſhould continue dry, it will greatly promote their taking new root, and ſecure them from the injuries of the drying winds. In this nurſery the plants may remain two or three years, according to the growth they ſhall have made; and, during this time, the ground between the plants ſhould be conſtantly kept clean from weeds, and dug between the rows every ſpring; in doing of which, care muſt be taken not to cut or injure the roots of the plants: this is all the culture they will require during their continuance in the nurſery: and, when they are tranſplanted into the places where they are to remain, the neceſſary care to be taken is, in taking them up, not to injure or cut off their roots, and let them be as little time out of the ground as poſſible; and, when they are out, to guard their roots from the drying winds. The ſureſt time for removing of theſe trees is about the beginning of April; though they may, and often are removed with ſucceſs a Michaelmas, yet the ſpring is the more ſure ſeaſon, eſpecially in moiſt land.

Moſt of the kinds of firs may be removed at the height of ſix or ſeven feet; but thoſe of two feet high are much better, and will in a few years get the better of thoſe taller trees. *Miller's Gard. Dict.*

FISH-PONDS, reſervoirs of waters, applied to the breeding or feeding of fiſh.

Fiſh-ponds are no ſmall improvement of watery and boggy lands, many of which are fit for no other uſe. In making

making of a pond, its head ſhould be at the loweſt part of the ground, that the trench of the flood-gate, or fluice, having a good fall, may not be too long in emptying. The beſt method of making the head ſecure, is to drive in two or three rows of ſtakes about ſix feet long, at about four feet diſtance from each other, the whole length of the pond head, whereof the firſt row ſhould be rammed at leaſt about four feet deep. If the bottom is falſe, the foundation may be laid with quick-lime, which ſlacking, will make it as hard as a ſtone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and ſtakes; and when theſe are well cevered, drive in others, as they ſee occaſion, ramming in the earth as before, till the pond-head be of the height deſigned.

The dam ſhould be made ſloping on each ſide, leaving a waſte to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepeſt part need not exceed ſix feet, raiſing gradually in ſhoals towards the ſides, for the fiſh to ſun themſelves, and lay their ſpawn. Gravelly and ſandy bottoms, eſpecially the latter, are beſt for breeding; and a rich ſoil with a white fat water, as the waſhing of hills, commons, ſtreets, ſinks, &c. is beſt for fattening all ſorts of fiſh. For ſtoring a pond, carp is to be preferred for its goodneſs, quick growth, and great increaſe, as breeding five or ſix times a year. A pond of an acre, if it be a feeding and not breeding one, will every year feed two hundred carps of three years old, three hundred of two years old, and four hundred of a year old. Carps delight in ponds that have marl or clay bottoms, with plenty of weeds and graſs, whereon they feed in hot months.

Your pond ſhould be drained every three or four years, and your fiſh ſorted. If it is a breeding one, the ſmaller ones are to be taken out to ſtore other ponds with, leaving a good ſtock of females, at leaſt eight or nine years old, as they never breed before that age. In feedings ponds it is beſt to keep them pretty near of a ſize. *Mortimer's Huſbandry, vol.* I. *pag.* 290.

FISTULA, a deep, narrow, and callous ulcer, generally ariſing from abſceſſes. *See* ULCER.

FISTULAR, FISTULOUS, an epithet applied by farriers to wounds and ulcers, which degenerate into fiſtulas.

Fiſtular, or *fiſtulous*, is alſo an epithet applied by botaniſts to leaves and flowers which are tubular, or that reſemble a hollow pipe.

FLAGS, the turf, or ſurface of the ground, which they pare off for burning. *See* BURN-BAKING.

FLAIL, a well known implement of huſbandry, uſed in threſhing all ſorts of corn. *See the article* THRESHING.

FLAX, the name of a plant cultivated both for the ſake of its ſtalk and ſeed, the former being uſed in making linen, and the latter for oil.

The ſtem of this plant, which is round and hollow, grows to the height of about two feet, and then divides into ſeveral branches: theſe are terminated by blue flowers, conſiſting of five petals, and are ſucceeded by capſules divided within into ten cells, in each of which is encloſed a bright, ſlippery, elongated ſeed. Its leaves are long, narrow, ſharp-pointed, and placed alternately along the ſtem and branches.

The ſoil for flax ſhould be a ſtiff loam, rendered fine by tilth, and ſituated in a valley bordering upon water; or ſuch a ſoil as is thrown up by rivers. If there be water at a ſmall depth below the ſurface of the ground, it is thought ſtill better, as is the caſe in Zealand, which is remarkable for the fineneſs of its flax, and where the ſoil is deep and ſtiff, with water almoſt every where, at the depth of a foot and a half, or two feet underneath it. It is ſaid to be owing to the want of this advantage, that the other provinces of Holland do not ſucceed equally well in the culture of this uſeful plant; not but that fine flax is alſo raiſed on high lands, if they have been well tilled and manured, and if the ſeaſons are not very dry.

It is juſtly remarked in the letters which the Dublin Society have publiſhed on the culture of flax, that moiſt ſtiff ſoils yield much larger quantities of flax, and far better ſeed, than can be obtained from light lands: nay, that the ſeed procured from the former way, with proper care, be rendered full as good as any that is imported from Riga or Zealand: but, as M. du Hamel rightly obſerves, ſtrong land can hardly yield ſuch fine flax as that which grows on lighter ground.

In the ſouthern countries, the huſbandmen who raiſe flax, ſow part of their ſeed in September and October; ſo that the plants which ſpring from thence, remain of courſe in the ground all the winter; and this is a judicious practice in thoſe places, becauſe plants which have not covered the earth well before the ſummer heats come on, are apt to be parched by the heat and drought which uſually prevail in that ſeaſon. They ſow linſeed again in the ſpring; but the latter do not yield ſo large a crop: the flax, however, which it produces is more eſteemed, becauſe it is finer than that ſown in autumn. M. Du Hamel ſeems, indeed to think, that the autumnal ſowing yields the beſt ſeed; but however that be, in places where the winter is apt to be ſevere, and where the flax, which is but a tender plant, would in courſe be in danger of being deſtroyed during that ſeaſon, almoſt all the flax is ſown about the end of March, or in the beginning of April. This ſpring flax is what we ſhall principally conſider in this article.

It may be laid down as a general rule, that the land which is intended for flax ſhould be brought to exceeding fine tilth by repeated ploughings, and that it ſhould be enriched by a manure ſuited to the quality of the ſoil. Thus, when a paſture is broken up in order to its being ſowed with flax, it muſt be well ploughed during eighteen months, or two years, before it will be fit for producing a crop of flax. To defray the expence of this culture, ſome other crops may be got off the land in the mean time, eſpecially of ſuch plants as do not occupy it long, and particularly of thoſe which are remarkably benefited by frequent ſtirring of the earth whilſt they grow; ſuch as beans, peaſe, turnips, &c. becauſe theſe repeated ſtirrings render the mould fine and looſe, and help to kill the weeds, which would otherwiſe do great damage to the flax. The Memoirs publiſhed by the Society of Brittany informs us, that the Livonians, when they clear woodland, burn the wood upon it, then plough it, and in this ſtate preſer it to any other kind of ſoil for flax.

If the land which is intended for flax be ſtiff, great care ſhould be taken not to till it when it is wet, for fear of kneading it.

If the ground of which flax is to be raiſed has been long in tillage, it ſhould be ploughed deep before winter, and

The foot Machine for Breaking & Beating Flax & Hemp: Invented by Mr. R. Macpherson.

End Elevation.

Side Elevation.

Lifting Cranks

1st Position.

Brake upper Teeth.

Under Teeth & Guides.

Ground Plan.

Scale of Feet

and laid up in a very high ridges, in order that the winter's frosts may the more effectually moulder or loosen it.

In the month of February, if the land be not too wet, some very rotten dung should be laid in the furrows, and immediately covered over. In march, for southern countries, or in the beginning of April, where the climate is colder, another ploughing should be given to lay the land smooth, the clods should be broken by hand, or with the spiky-roller, and the seed should then be sown and harrowed in with a light or bush-harrow, so as not to bury it above an inch deep. If the soil be moist and cold, a little pigeon's dung may be sown with the seed, for it agrees admirably well with the flax: but this must not be done if the ground is very light and too dry. It will also be right to lay wet land out in beds thirty or forty feet wide, separated by deep trenches, to drain off the water, and convey it into the surrounding ditches.

Most of our linseed is brought from the North, namely from Riga and Zealand: but we may ourselves raise it very good, by conforming to the directions here given.

Linseed is reckoned good when it is large, oily, heavy, and of a bright brown colour. To know whether it be oily, a few grains of it are thrown into a red-hot fire-shovel, and they in that case crackle almost instantly and blaze briskly. If it is sufficiently heavy, it will sink to the bottom of water; and to judge whether it be new, a number of seeds exactly counted should be sown on the end of a hot-bed, and notice taken whether they all grow.

The best way of sowing flax, in order to obtain very good seed, is to drill it in equidistant rows about a foot distant, and then it may be hand hoed, which will keep down the weeds, and improve the crop. But it is still better to drill the rows about twenty inches asunder. The seed being smooth and heavy, is very proper for drilling, and in this way a very small quantity of seed sows an acre. The common allowance of seed sown broad cast is about two bushels and a half to an acre, oftener more than less; but drilled in rows at twenty inches distance, half a peck is sufficient for an acre.

Thick sown flax runs up in height, and produces fine soft flax; if sown thin, it does not rise so high, but spreads more, and puts forth many side branches, which produce abundance of seed, and such seed is much better filled, plump, and heavy, than the seed produced from thick sown flax. Nothing should be planted or sown between the rows, but the ground should be hoed with a hand hoe, or small plough, taking care that none of the mould is thrown against the rows; to prevent which the intervals may be hoed with a triangular harrow, having a proper number of iron tines in it, and guided by two handles fixed behind. By these handles the tines are made to go deeper or shallower at pleasure; and if the intervals are cultivated with this instrument, beginning before the earth is become stale, and while the weeds are small, the land may be kept very clean, and in fine tilth, at a much less expence than by hand hoing: for one horse is sufficient for this work; a great deal may be done in a day, and by a frequent repetition of this hoing, especially when the earth is dry, the weeds may be so effectually kept down, as never to rise much above an inch high. But the rows must be weeded by hand.

The flax thus cultivated is shorter than common, but stronger. It is not so subject as other flax, to be beat down and lodged in stormy weather, the stalks of it being fortified by the free admission of the sun and air among them; and there is sufficient room to hand weed the rows, without lying upon, or treading down the flax, as in the common way of weeding.

It is usually reckoned, that in flax sown broad cast, the flax and seed are nearly of equal value. And it will no doubt be said, that by sowing it so thin, the crop of flax will be much lessened, which must be acknowledged; but the great object here is the quality of the seed, which will be incomparably superior to the seed commonly sowed here; and if duly cultivated, in the method here laid down, will, in respect of the size and weight of the seed, excel either the Plantation or Riga seed.——In this way also, lighter land will produce better seed than in the common flax husbandry; because the earth that is kept in fine tilth, to any considerable depth, retains more moisture in dry weather, than soils of the same kind that is badly tilled, or suffered to grow stale and hard.

A change of seed is found necessary in cultivating some kinds of plants, particularly of wheat and some other sorts of corn, otherwise they are apt to degenerate. The necessity of changing seems to arise from the soil or climate: for which reason farmers choose to sow upon light land the seed raised upon clays, and other stiff soils, and the contrary, which they find of service; and the same advantage is found in some measure by a change of soils for flax seed. But this being a plant of nice culture, it seems most advisable, not to depend wholly upon a change of soil, even though the drilling and hoeing, as above, should still improve the seed in size and weight, beyond what is common in broad cast sowing; but rather to sow, every second and third year, the best foreign seed, by which means, and the hoing culture also, the flax farmer may be sure of having good seed every year.

When the goodness of the seed is known, more or less of it is to be sown, according as the husbandman intends either to raise a quantity of linseed for sowing, or to have very fine and soft flax. In this last case, the seed should be sown pretty thick, in order that the plants may rise the closer together, and by that means grow slender and tall, which adds much to the fineness of the fibres of the flax. If the linseed is sown with an intention to let the flax remain for seed, a much less quantity of it should be used, that so the plants may come up thin, and thereby have room to grow to their full vigour and extent. As strong soils should be chosen for this purpose, it may perhaps be most advisable to follow the example of the judicious M. de Chateauvieux, in sowing it in drills, and horse-hoeing the intermediate spaces. He observed in his experiments, that the plants of flax thus raised yielded great plenty of excellent seed.

Some sow, with their linseed, either annual or perennial grass-seeds, when they intend to lay the land down for pasture after the flax is taken off. The plants grow but weakly under the flax, which, however, they do not hurt; but as soon as the flax has been pulled, they increase apace, to the great benefit of their owner.

Flax is ſometimes damaged by inſects when it is about three or four inches high. It is ſaid that they may be deſtroyed by a ſlight ſtrewing of ſoot, aſhes, &c. At all events, it is certain that this dreſſing will give vigour to the flax, though it ſhould not kill the inſects.

If any weeds appear among the flax, as is almoſt always the caſe, they muſt be throughly rooted out; and that the flax may be as little damaged as poſſible in the doing of this the weeders ſhould work bare-footed: they may indeed ſit down upon the flax, for ſitting upon it is found not to hurt it; but it would be greatly injured, if not killed, by being trod upon with the heels of ſhoes.

The fineſt flax is moſt liable to be laid, particularly in countries ſubject to ſtorms. To guard againſt this accident, ſome people run acroſs their flax field ſlender poles fixed to ſtakes: but a better method, and which is practiſed by the ingenious gentleman who directs the cambrick manufactory at Winchelſea, is, to run ſmall ropes acroſs the field, both lengthwiſe and breadthwiſe; for theſe, being faſtened where they interſect one another, and ſupported by ſtakes at due diſtances, from a kind of netting, which is proof againſt almoſt every accident that can happen from tempeſtuous weather.

Opinions are divided in regard to the degree of ripeneſs at which it is beſt to pull flax. Some think it ſhould be pulled whilſt it is green, in order that its fibres may be the ſofter and finer. Others, with the ſame view, pull it up before its ſeeds are quite formed; and others again think, that it ſhould not be pulled till ſome of the capſules, which contain the ſeeds, have begun to open, being of opinion, that the fibres of green flax are too tender, and that they fall into tow. On the other hand, it is certain, that the fibres of flax which has ſtood till it is very ripe, are always ſtiff and harſh, that they are not eaſily ſeparated from the reed, and that they do not bleach well. Here, therefore, as in moſt other caſes, both extremes ſhould be avoided; and it conſequently ſeems moſt reaſonable to think, that the propereſt time for pulling flax, is when its ſtalks begin to turn yellow, when its leaves begin to fall, and when its ſeeds begin to be brown.

As ſoon as the flax is thought to have attained a due maturity, it is pulled generally by handfuls: but as it is ſeldom all of an equal degree of ripeneſs, or of an equal degree of ſtrength, it would certainly be adviſable to pull firſt the ripeſt and ſtrongeſt plants, and then the weaker and leſs ripe; for by this means they would at once be ſeparated, which is of eſſential importance in the watering, becauſe the weak and green flax requires much leſs ſteeping than the ſtronger and more ripe. All weeds, and the earth which adheres to the roots of the plants, ſhould be carefully taken away, and then the handfuls of flax ſhould be laid regularly on the ground.

The author of the judicious letters concerning flax, in the Dublin Society's Weekly Obſervations, ſeems to direct a too great degree of ripeneſs of the flax when it is pulled, and aſſigns as a reaſon, that it does not otherwiſe ſtand the force of the mill for ſcutching it. But as it has been found by experience, that the force of that mill is too great, and as a better method of performing this operation, in which the force can be ſuited to the ſtrength of the flax, will ſoon be publiſhed, this great degree of ripeneſs will become the leſs neceſſary.

As the flax is pulled, it is laid together by handfuls, with the ſeed ends turned to the ſouth. Theſe handfuls ſhould neither lie quite in a line with each other, nor directly acroſs, but a little ſlanting upwards, ſo that the air may eaſily paſs through them. Some, inſtead of this method, tie the handfuls of flax looſely at the top, then ſpread out their roots, and thus ſet ſeveral of them together upright upon their roots. In either of theſe ways, the flax is generally left twelve or fourteen days in the field to dry it. This drying is certainly not neceſſary for the rippling, becauſe the ripple will ſeparate the capſules from the flax as effectually before it has been dried as it will afterwards; and if it be done with a view to ripen the ſeed, it ſhould be conſidered, that the flax will be more hurt by the longer time of ſteeping, which will become neceſſary in conſequence of this drying, than the ſeed can be benefited; becauſe the more the membrane which connects the fibres to the reed is dried, the greater muſt be the degree of putrefaction neceſſary to looſen and deſtroy the coheſion of this connecting membrane: the finer parts of the flax itſelf muſt neceſſarily be deſtroyed by this degree of putrefaction; and if the putrefaction does not ariſe to ſuch a degree as to deſtroy the coheſion of this membrane, the fibres of the flax will adhere ſo ſtrongly to the reed, that the force neceſſary in ſcutching will prove equally detrimental to the flax. The practice in ſome parts of Brittany, as we are informed by the Memoirs of the ſociety of that province, ſeems therefore much more rational; and this is, to ripple the flax after it has lain in the air two or three days; but even one day will be ſufficient if the weather is dry.

If any flax is raiſed on purpoſe for ſeed, or if, through the dryneſs of the ſeaſon, or the badneſs of the ſeed that was ſown, the flax is come up very thin, ſo as manifeſtly to ſhew, that the ſeed which it may produce will be more valuable than the reſt of the crop; in either of theſe caſes, the flax ſhould be let ſtand till its ſeed is perfectly ripe; thus ſacrificing the flax itſelf to the then greater advantage of having good ſeed.

In order to ripple the flax, which is the next operation, a large cloth ſhould be ſpread on a convenient ſpot of ground, with the ripple placed in the middle of it. The manner of performing this work is ſo well known, that there can be no need to deſcribe it here. Its purpoſe is to obtain the linſeed, which is always of conſiderable value, even though the flax has been pulled before its perfect maturity.

After the flax has been rippled, the ſeeds thereby obtained ſhould be ſpread in the ſun, to dry. Thoſe which ſeparate from the pods of their own accord are the fulleſt and ripeſt, and ſhould therefore be ſet apart for ſowing, in caſe the precaution of raiſing ſome flax purpoſely for ſeed has not been attended to. The pods, or capſules, are then broken, either by treading or by threſhing, in order to get out the remaining ſeeds, the whole of which, as well as the former, ſhould be carefully ſifted, winnowed, and cleaned. When the ſeed is laid up, it muſt be frequently ſtirred, or ventilated, to prevent its heating. Even this ſecond ſeed affords a conſiderable profit, by the oil which it yields, and alſo by being uſed, when broken, for fattening of cattle. The cakes of linſeed, after the oil has been preſſed out of them, are likewiſe found to be uſeful for this laſt purpoſe, though they are thought to render the fat of cattle yellow; for which reaſon it is adviſed not to give them till within a few weeks before the beaſts are to be killed. Their utility as a manure has been already mentioned.

As

As ſoon as the flax has been rippled, it ſhould be carried with all convenient ſpeed to the watering place: If care has not been taken before to ſeparate the different kinds of flax, that ſeparation muſt now be made: becauſe otherwiſe, ſome of the flax will be rotted in the water, before the reſt will be ſufficiently ſteeped.

The choice of the water for ſteeping it in is thus very properly pointed out in the Directions for raiſing Flax, publiſhed by order of the commiſſioners and truſtees for fiſheries, manufactures, and improvements, in Scotland.

"All flax ought to be watered in canals, which ſhould be dug in clay ground if poſſible, becauſe that ſoil beſt retains the water: but if a firm retentive ſoil cannot be got, the bottom or ſides of the canal, or rather both the bottom and ſides, may be lined with clay; or, inſtead of lining the ſides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

"A canal of forty feet long, ſix broad, and four deep, will generally water the produce of at leaſt an acre of flax.

"It ſhould be filled with freſh ſoft water from a river or brook, if poſſible, two or three weeks before the flax is put in, and expoſed all that time to the heat of the ſun. The greater way the river or brook has run, the ſofter, and therefore the better, will the water be. Springs, or ſhort runs from hills, are too cold, unleſs the water is allowed to ſtand long in the canal. Water from coal or iron is very bad for flax. A little of the powder of galls thrown into a glaſs of the water, will immediately diſcover if it comes from minerals of that kind, by turning it into a dark colour, more or leſs tinged, in proportion to the quantity of vitriol contained in it.

"The canal ought not to be under any ſhade, becauſe this, beſides keeping the ſun from ſoftening the water, might render ſome parts of the canal cooler than other parts, and thereby make it water the flax unequally.

"The flax raiſer ſhould obſerve, that, when the water has been brought to a proper degree of heat by the ſun, ſmall plants will riſe quickly in it, numbers of ſmall inſects and reptiles will generate there, and bubbles of air will riſe up to its ſurface. If no ſuch ſigns appear, he may conclude, that the water is not warm enough, or that it is otherwiſe unfit for flax."

Running water is not proper for ſteeping flax, becauſe it prevents that degree of putrefactive fermentation which is neceſſary to ſeparate the fibres from the reed; and beſides this, in ſuch ſtreams, the flax is apt to be carried away by ſudden floods, or to be filled with the mud and ſlime which thoſe floods bring with them: but to have a ſmall rill of water paſs through the ſteeping place is very adviſable, becauſe it will ſupply the loſs of that which is evaporated. Stagnant water, which is naturally of a bad colour, ſhould likewiſe be avoided, becauſe this communicates to the flax a colour which is not afterwards eaſily got rid of.

The flax, after it has been rippled and ſorted, as before mentioned, ſhould be tied very ſlack, with a band made of a few ſtalks, in bundles not larger than a man can eaſily graſp with both his hands, in order that the water may the more eaſily and more equally penetrate through them; and in this condition they ſhould be put into the canal, ſomewhat ſloping, or even half-ſtanding upon one end, which, ſay the Edinburgh directions, ſhould be the ſeed end, and conſequently the root end uppermoſt; becauſe, add they, (though I do not find it at all noticed by any other writers on the ſubject) when the ſeed ends are uppermoſt, there frequently breeds a great deal of vermin, deſtructive of the flax, and this, they aſſure us, is effectually prevented by putting the ſeed end downmoſt. However this may be, the flax, when put into the water, ſhould be covered with ſtraw, or fern, upon which a wicker hurdle and ſome ſtones may be laid, to keep it down, but without preſſing too hard againſt the bottom. It is a common opinion, that if the flax is not thus covered, the ſun will diſcolour it, even though it be quite covered with water.

More or leſs time is requiſite for the ſteeping of the flax, according to the nature of the water, the heat of the air, and the greater or leſs degree of woodineſs of the flax. It is ſteeped ſooner with a ſouth than a north wind: and that which has been pulled green is alſo much ſooner ſteeped than that which has been pulled when very ripe: conſequently it is not poſſible to fix any preciſe length of time during which it ſhould remain in the water. The way to know whether it has been ſteeped enough, is to draw a few ſtalks from out of the middle of the heap, and then try it: if the reed ſnaps ſhort, without bending, and if the bark parts eaſily from the reed, towards its point, the flax has been ſufficiently ſteeped, and it muſt, in this caſe, be ſpeedily taken out of the water, for otherwiſe it will ſoon become too tender, and begin to rot.

In ſome countries, the flax is ſteeped but four days, at the end of which it is taken out of the water, and the little bundle, or handfuls, into which it was before made up, are laid regularly ſide by ſide, till they have formed a pretty thick bed, upon which are then put planks loaded with ſtones. The flax is left in this condition four or five days, or more, according to the heat of the air; and its lying thus in a heap anſwers the intent of farther ſteeping in water: but as a great degree of putrefaction may ariſe in this operation, ſo much judgment and care are neceſſary, that I cannot think it an adviſable method.

The memoirs of the Society, which the ſtates of Brittany have inſtituted, upon a truly judicious plan, for the improvement of agriculture, arts, and commerce, inform us, in conſequence of an account which the duke of Choiſeul, miniſter of ſtate in France for foreign affairs received from the French ambaſſador at the court of Ruſſia, to whom he had written on this ſubject, at the requeſt of the ſociety, that the Livonians uſe two ſorts of places for ſteeping their hemp and flax; that the moſt ſimple of theſe are only holes dug near the ſide of rivers, and that the flax, or hemp, watered in them (which is very like the method practiſed in France) generally ſells for from twenty-five or thirty per cent. leſs than that which has been ſteeped in the following manner.

When they would have flax or hemp of ſuperior quality, they chooſe a ſpot where there is a fall of clear water, and there make, one under another, five, and ſometimes ſix, baſons or reſervoirs, each of which is at leaſt one foot, and at moſt two feet deep. The water can either be let run from one baſon to another, or be ſtopped at pleaſure. The baſons are ſeparated by ſlight banks of clay; and in each bank is a little opening, which may be cloſed whenever it is thought proper. To prevent the ſtream from overflowing the firſt baſon, and afterwards ſucceſſively the others, it is itſelf turned a little aſide by a ſmall bank of clay, and this bank is broken down whenever the water is to be renewed in the baſons.

The Livonians put their hemp and flax firſt into the uppermoſt

uppermoſt baſon only. At the end of two, three, or four days, they remove it into the ſecond baſon, from thence into the third, and ſo on, till they have brought the ſeveral bundles of theſe plants down into the loweſt. At each of theſe ſhifting, the firſt baſon is filled with freſh flax, and the water is renewed in all the baſons. By this means, the ſteeping is not completed till the flax or hemp has paſſed through all the baſons, and has remained a proper time in the lowermoſt, which is the laſt. Neither the Engliſh nor the Dutch import any hemp from Riga, but what has been ſteeped in this laſt mentioned manner; whereas a great part of that which the French receive from thence, is ſuch as has been ſteeped in ſtagnant waters, in holes dug on the ſide of rivers.

When the flax is taken either out of the water in which it has been ſteeped, or from the heap above-mentioned, the bundles of it are ſpread out, like a fan, at the root end, and laid on dry new-mown meadow, that it may dry, bleach, and become ſupple. It is there turned from time to time, and as ſoon as it is quite dry it is carried off: for otherwiſe the moiſture of the dews and graſs will have nearly the ſame effects upon it, as if it had remained longer in the water. This is evinced by the practice of thoſe, who, in ſome places, inſtead of putting their flax into water, only ſpread it on a damp meadow where the graſs is ſomewhat long, leave it there all night, and in the morning, before the ſun has dried it, gather it up in large heaps, and remove it into the ſhade, in order to ſpread it out again on the graſs the next evening; and this is repeated till the flax is found to be ſufficiently watered. In other places, it is watered by hand during the day, and ſo let it remain conſtantly on the graſs. It is then let dry, and is afterwards houſed. But, as M. Du Hamel rightly obſerves, this method is ſo tedious and troubleſome, that, even if it ſhould, as ſome ſay it does, give a little additional whiteneſs to the flax; yet the advantage in that reſpect is ſo ſmall, as by no means to compenſate for the inconveniences of the practice, which he therefore thinks is not adviſable in any caſe, unleſs it be when the flax, after being taken out of the water, is found not to have been ſufficiently ſteeped.

The diſadvantage of laying the flax upon long graſs, after it has been ſteeped, in order to dry it, is very juſtly pointed out in the Directions for raiſing Flax, publiſhed by order of the commiſſioners and truſtees for fiſheries, manufactures, and improvements in Scotland, when they adviſe the huſbandman by no means to follow this method, becauſe the graſs, growing through the flax, frequently ſpots, or rots it. Theſe judicious gentlemen therefore recommend ſhort heath as the moſt preferable place for ſpreading flax upon, after it has been taken out of the water; and this the rather, becauſe, when the flax is wet, it faſtens to the heath, and is thereby prevented from being blown away by the wind, whilſt at the ſame time the heath keeps it a little above the earth, and ſo expoſes it the more equally to the weather: but grounds expoſed to violent winds ſhould alſo be avoided.

"The flax, continue they, when taken out of water, muſt be ſpread very thin upon the ground; and as it is then very tender, it muſt be gently handled. The thinner it is ſpread the better, as it is then moſt equally expoſed to the weather: but it ought never to be ſpread during a heavy ſhower, becauſe that would waſh and waſte too much the bark, which is then exceſſively tender; though it ſoon after becomes firm enough to bear the rains, which, with the open air and ſunſhine, clean, ſoften, and purify it to the degree deſired, and fit it admirably for parting from the reed: in ſhort, after the flax has acquired a little firmneſs by being a few hours ſpread in dry weather, the more rain and ſunſhine it gets, the whiter and better it will be.

"The ſkilful huſbandman, who follows this method, ſpreads his firſt row of flax at the end of the field from whence the moſt violent wind commonly comes, placing the root-ends foremoſt: he makes the root-ends of every other row overlap the ſeed-ends of the former row three or four inches, and binds down the laſt row with a rope; by which means the wind does not eaſily get below the flax, to blow it away: and as the ſeed-ends are ſeldom ſo fully watered as the root-ends, this over-laying has an effect like giving the ſeed-ends more watering.

"The flax is judged to have been ſufficiently graſſed, when it is of a clearer colour than before, when its bark is bliſtered up, when that bark parts eaſily from the reed, and when the reed is become very brittle: but no written deſcription can poſſibly here convey a knowledge of this point, at all equal to that which is acquired by experience.

"The whole of the flax ſhould be ſufficiently graſſed before any of it is lifted; for if a part be lifted ſooner than the reſt, that which remains will be in great danger from the winds.

"A dry day ſhould be choſen for taking up the flax; and if there is no appearance of high wind, it ſhould be looſed from the heath or graſs, and left looſe for ſome hours, to make it throughly dry.

"As a great quantity of flax can ſcarcely be equally watered and graſſed, and as its different qualities will beſt appear at lifting it off the graſs, each different kind ſhould then be collected together, and kept by itſelf, that is to ſay, all of the ſame colour, length, and quality.

"The ſmaller the bundles are into which the flax is made up, the better they will be for drying, houſing, &c. and in making up theſe bundles, as in every other operation upon flax, it is of great conſequence that all the ſtems be laid together as they grew, that is to ſay, root-ends to root-ends, and ſeed-ends to ſeed-ends.

The Livonians, ſay the before quoted Memoirs of the Society of Britany, cut off the roots of their hemp, but not of their flax, when it is taken out of the ſteeping baſons above deſcribed. They then tie the flax or hemp up in bundles about as thick as the lower part of a man's thigh. Theſe bundles are placed upright, and ſupported by a ſtake, around which a few of the tops of their ſtalks are twiſted, the better to ſecure their ſtanding. They are left in this ſituation one day, to drain; then they are ſpread upon the graſs for one or two days, and after this they are laid in heaps, and covered over with haulm, ſtubble, ſtraw, or ſome other ſuch like covering, to make them ſweat. When the hemp or flax has ſweated enough, it is laid in heaps in the ſhade, and there dried: but theſe heaps muſt not be ſo thick, but that the air may penetrate a little into them. It is on this laſt operation that the good or bad quality of the hemp or flax thus managed chiefly depends. Both of them may be kept two or three years, and even longer, upon their reeds, after they have been prepared in the manner above directed; and when it is intended to break them, after this keeping, they are put into an oven properly heated.

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In the common way, after the flax has been graſſed, it muſt be dried by heat, to make its reed break readily, and ſeparate the more eaſily from the bark. To guard againſt the danger of fire, this buſineſs is frequently performed in a place diſtant from any other building. The caverns, or hollows under hills, or rocks, before deſcribed for drying hemp, are alſo very proper for this purpoſe.

There are two general ways of drying flax. Some place againſt a wall, upon uprights and croſs pieces, a hurdle of which the bars are ſmall, and about two inches aſunder, and upon this the flax is ſpread four, five, or ſix inches thick: a ſmall fire, made of broken reeds of flax, is cautiouſly kindled under it, and care is taken to turn the hemp from time to time, that it may dry equally in every part: the flax-dreſſer takes off only that part of it which is at the ſide of the hurdle next the wall, then puſhes the reſt forward into its place, and fills with freſh flax the vacancy thereby made at the fore-part of the hurdle. This operation ſhould not be entruſted to any but a very attentive perſon, becauſe if the flame ſhould be ſuffered to riſe too high, it would ſet fire to the flax. It is true, indeed, that this ſeldom happens; and when it does, the loſs is not great, becauſe but a ſmall quantity of flax is laid together on the hurdle. Some ſay, that the ſmoke of the fire thus made of the broken reeds hurts the colour of the flax, and that this leſſens its price when it is ſold; but that the quality of the linen made of it is not at all the worſe, this diſcolouring being eaſily removed by bleaching.

The other method of drying flax is by putting it into a hot oven. The Livonians make their ovens, for this purpoſe, either of clay, brick, or hewn-ſtone. Thoſe which are built with clay, are ſometimes large enough to contain eight hundred bundles at a time: but it is more common to make them for only two, three, or four hundred. They are ſhaped like the ovens for an army, that is to ſay, they are very high arched. They require no greater degree of heat, which is given with dead wood, furze, broom, &c. than is juſt ſufficient to render the reed of the flax brittle; and the ſame of hemp, for the Livonians uſe them for both theſe plants, the bundles of which they ſet upright in them, and as ſoon as they take them out of the oven, they carry them to a kind of a mill, to be broken.

The Dutch build their ovens for drying flax within a large capacious chimney at the end of the building where the breakers and ſcutchers work. The uſual dimenſions of this building, which is well lighted, are, in the clear, thirty feet by fourteen; but it is ſometimes larger where great buſineſs is carried on, though ſeldom, if ever, leſs. The dimenſions of the oven here generally are fifteen feet in depth, ten in breadth, and five feet in height: its roof is arched, its entrance, which is juſt large enough to admit a man with tolerable eaſe, is made to ſhut cloſe with a wooden door. This oven is not heated with wood, excepting at the very firſt; for after the workmen have begun to dreſs the flax, the broken reeds, and other refuſe parts which are beaten off it, and ſwept up, ſuffice to continue the heat, ſo that each parcel affords firing for the next, till the whole is dried. The Dutch kindle the fire in the oven ſome hours before the day's work is over. The ſweepings of the flax light eaſily, and the oven heats and cools again ſufficiently before the breaking, and ſcutching is finiſhed. They fill it when they leave off work; and the next day when they return to it they find the flax dry and fit for breaking. The flax breaks beſt and moſt eaſily when it is a little warm and criſp: and conſequently the working it then is cheapeſt and moſt advantageous; and accordingly the Dutch never draw two bundles together from the oven, but take them one by one as they want them. It will, perhaps, be needleſs to obſerve, that when the oven is heated, it muſt be well cleaned before the flax is put in; for the leaſt ſpark will ſet the flax on fire, and this would be a conſiderable loſs, as the ovens hold a large quantity.

The famous M. Tſchiffeli, of Berne, in Switzerland, has obliged the public with a Memoir on the Culture of Flax, the ſubſtance of which we ſhall lay before our readers.

In his directions for the choice of ſeed, he ſays, it ſhould be of a bright ſhining brown colour, not flat, but thick and plump; ſhould crackle much when caſt on live coals, and ſhould ſink to the bottom almoſt as ſoon as thrown into water.

With reſpect to ſoils, this writer obſerves, that any may do for flax, provided it is not too wet, or too ſtoney, and has not too much ſand or gravel mixed with it: ſome, however, are to be preferred, particularly black earth, neither too ſtrong nor too light; and, in general, ſtrong land is to be preferred to light.

To prepare graſs-grounds and paſtures for ſowing flax, M. Tſchiffeli lays down the following rules:

The land ſhould, by the end of July at lateſt, be turned up in ſmall furrows, about two inches deep. Early in the month of September, a heavy harrow ſhould, in dry weather, be drawn over the field, in order to pulverize the ſoil; and the month following, if the land is not in great heart, it ſhould have a good dreſſing of dung, which being firſt regularly ſpread, ſhould, in dry weather, be ploughed in to the depth of ſix inches at leaſt, with narrow furrows, leaving the field rough all the winter.

In the following ſpring this gentleman obſerves, that as ſoon as the ground is dry, the land ſhould have a good harrowing; and about the middle of April, which is in Switzerland the ſeaſon for ſowing, it ſhould, in dry weather, have its third ploughing, ſomewhat deeper than the ſecond; and if the weather ſhould not immediately afterwards be favourable for ſowing, the land ſhould the ſame day be harrowed down ſmooth.

When flax is to be ſown on a fallow, the three uſual ploughings are to be given, obſerving only, that every ploughing is deeper than the laſt; and the dung ſhould be buried by the laſt, leaving it rough during the winter, and managing it as above in the ſpring.

When flax is ſown the ſecond year after a fallow, the land being dunged the preceding year, and in good heart, no manure will be neceſſary; but immediately after harveſt it muſt be ploughed about two inches deep, to prevent the weeds from growing and impoveriſhing the ſoil. As ſoon as any weeds afterwards make their appearance, it muſt be well harrowed with heavy harrows, and about Michaelmas ſhould be ploughed in narrow furrows, about ſix inches deep, lying rough during the winter ſeaſon. The following ſpring the ridges ſhould be harrowed down, and afterwards laid ſmooth with ſmaller harrows, being in April ploughed for the laſt time.

Flax, M. Tſchiffeli remarks, thrives beſt upon land that has the preceding year borne a crop which ſhaded the ground,

ground, and prevented the weeds from growing; therefore good flax is ſeldom got after rye.

This writer very juſtly obſerves, that the quantity of ſeed to be ſown ſhould be proportioned to the nature and condition of the land, never leſs than two, nor more than three buſhels to the acre. Light land ſhould be ſown earlieſt, but always after the dread of white-froſts is over, and never in rainy weather, or when the ground is wet; a mild day is beſt for this purpoſe, when the wind is not in the north-eaſt, and dew may be expected in the evening.

It is beſt, our ſenſible huſbandman ſays, to begin to plough for ſowing after noon, the harrow following cloſe at the heel of the plough. A little before ſun-ſet, the ſeed is to be ſpread, beſt at three caſts, and the work left in this ſtate till the next morning, when, without fail, the ſeed muſt be covered with light harrows, or ſtrong rakes. If the ſoil is rather light, and the ſpring likely to be dry, it will be beſt to roll the land; and if it was not manured before the winter, ſome very rotten dung may be ſpread after the ſeed is harrowed in, and before the field is rolled.

It is better to uſe no dung at all than that which is not well rotted: ſoot and aſhes, hogs or cows urine, are good manures for flax, or in fact almoſt any thing that will not carry weeds on to the land.

When flax is grown to the height of about four inches, it may ſafely be weeded; but the precautions taken in Switzerland on this occaſion are worth notice. There the work is carefully executed, but with as much expedition as poſſible, the weeders going bare-footed into the field, and working as much as they can, either ſitting or lying down, heaping the weeds, and carrying them away every time they leave off working. The weeders ſhould alſo, if poſſible, always face the wind, by beginning at the corner of the field to which the wind blows, as in this method the flax will riſe the ſooner; and the work ſhould never be done in rainy weather, or when the ground is wet.

If the flax is to be propped, the beſt time to do it is at the time of weeding. To prop flax is to fix ſupporters, about the ſize of a man's finger, branched a little at the top, and about three or four feet long, at the diſtance of every three feet.

Flax ſhould be pulled in dry weather, in general, when the foot of the ſtalk begins to turn yellow, though the ſeed ſhould not be quite ripe. If the crop is not all of equal ripeneſs, the ripeſt ſhould be ſeparated, as, if all were to be graſſed together, the unripe part would be rotten before the other was ſufficiently graſſed: it is alſo beſt to pull, though at one time, the longeſt ſeparate from the ſhorteſt. When it is all pulled, it muſt be ſpread on graſs-ground, or on a ſtubble, the crop-end of the ſtalk being laid to the ſouth, that the ſeed may ripen the better.

M. Tſchiffeli is of opinion, that when the quantity is large, it is beſt to ſeparate the ſeed by threſhing as ſoon as it is got in, in the following manner. The beds muſt be made pretty thick, the crop-ends of the ſtalk touching the wall of the barn; and over the feet of the ſtalks a heavy plank is to be laid, to prevent the flax from being ſcattered about in threſhing. The wall, by confining the workmen, will prevent them from ſtriking too hard, and thereby damaging the flax.

If the quantity of flax is ſmall, it may be rippled in the ordinary way, obſerving only that the handfuls be not too large. When the ſeed is ſeparated, it muſt be laid on a cloth, expoſed to the ſun for ſeveral days; and afterwards it ſhould be kept in a very airy place; but muſt be ſtirred every two or three days for three weeks. It may be kept in this condition two or three years, without the leaſt damage; but when once this ſeed is deprived of its capſule, it will ſcarcely ever keep above a year.

When the flax has been rippled, it muſt again be laid, but thinner than the firſt time, on a graſs-field that has been about a fortnight before mown, being ſpread, if poſſible, in dry years on damp ground, and in rainy years on dry land, but never on wet meadows. It muſt at this period be carefully turned every other day, if the weather is wet, or the dews heavy.

The time the flax is in graſſing, depends on the coarſneſs or fineneſs of the ſtaple, the heat and the cold, dryneſs and wetneſs of the weather; but if, in bruiſing betwixt your fingers, the top of the ſtalk when it is dry, the harle or bark ſeparates eaſily from the woody part or boon, and this laſt is not tough, but brittle, the flax ſhould be taken from the ground, in order to be carried under cover as ſoon as it is dry.

The beſt method of drying flax for braking, this accurate writer ſays, is to dig a hollow place in the earth, two feet deep, three wide, and from twelve to fifteen feet long, lining it with ſtone, over which, at the height of about four feet, is fixed a griddle, or grating, conſiſting of ſmall poles, ſecurely made faſt to four or ſix piles, or ſtakes, driven into the ground.

The moſt proper fuel, we are told, for drying the flax, is either charcoal, or well-dried turf, as well becauſe they give an equal degree of heat, as on account of their not producing much of either flame or ſmoak.

When the workmen begin to brake the flax, they muſt go on briſkly; for it ſhould be done whilſt it is hot from the grating, and ſhould be effected by an equable motion, beginning at the crop-end.

In this manner does the ſenſible and patriotic Monſ. Tſchiffeli ſay that flax ſhould in this country be cultivated and managed; and; if we are not greatly miſtaken, the method might, with very little variation, be to advantage adopted in the Britiſh iſlands.

As different countries have different methods in cultivating the various productions of the earth in general, ſo thoſe relating to flax, in particular, are greatly diverſified. We have, therefore, given under this article every thing we thought worthy the reader's attention. The following is the method practiſed in the Mahera, a diſtrict of the county of Roſcommon in Ireland; and was wrote by Mr. John Irwin, a gentleman who has long cultivated flax there with ſucceſs.

Of the Cultivation and Management of Flax in the Mahera.

The poorer ſort of people in the diſtrict I live in, are ſo indigent, that they are almoſt in a ſtate of ſlavery. Indeed, within theſe laſt forty years, they have much recovered from their bare and naked condition, owing in a great meaſure to the conſiderable etexnſion of the linen manufacture.

Their chief riches conſiſt in their annual crops of flax, corn and potatoes, in order to pay their rents, which they help off with day-labour; a moſt galling article to them; for, as to cattle, few of them have any, or but a milch-cow or two at moſt, which are appropriated for nouriſhing generally

generally a numerous iſſue. The calves, which induſtry ought to be let remain with them to increaſe their funds, or to clothe their families, a rapacious landlord ſeldom wants a pretence of appropriating to himſelf. Theſe people then, from neceſſity, it is evident, muſt be perfectly verſed in the cultivation of flax and potatoes; and they would ſucceed very well as to corn, had they ſurmounted a few old prejudices reſpecting the form or make of their implements, and the methods of uſing them. It is, however, from ocular knowledge of their proceedings, in my work and their own, that what I now communicate to you is founded.

The ſoil about Oran, being ſtrong, deep, and moiſt, with a clayey loam moſtly at bottom, yields excellent flax. It is here ſcarcely ever produced immediately from the ley. The general practice is as follows: a parcel of ley land in good heart, that is, which has not been ploughed for many years, is proclaimed to be ſet to graſs potatoes (otherwiſe ſpaddane, a very miſtaken practice, eſpecially if a deep ſoil, if not to be ſanded, or if a light, if not marled, or otherwiſe manured) for this land the poor are charged from three pounds to five pounds per acre, ſanding not always included: a moſt unconſcionable price?

They generally bargain for two ſucceſſive crops; and it is for their benefit, as alſo for that of the land, to have it ſanded, becauſe it ſtrengthens it the better to ſtand a continuation of tillage, and to come the ſooner to turf, and yield a good coat of graſs, when let back into the ley; but the ſky-farmers (thoſe who hold at rack-rents) are moſtly ſo greedy for gain, that it is with reluctance they agree to ſanding, as it abates fourteen ſhillings per acre of their price. When land that requires it is not ſanded previous to this kind of tillage, it is doing it great prejudice; but farmers are not always ſollicitous about this matter, eſpecially on ſhort leaſes.

Land properly ſet in this way ought to be ſanded at leaſt a year before ſetting, that it might have proper time to penetrate into the earth, and impregnate it with its ſalts; but they are ſuch bad farmers about me, that they ſet, ſand, and plant their potatoes almoſt at the ſame time. Even in this bad way the land ſhould be ſet and ſanded (or otherwiſe manured) at leaſt in November, and the potatoes planted the March following at fartheſt: but I have ſeen land not ſanded till March or April, and not ſowed till towards the end of May, (a palpaple blunder;) yet this land has yielded a tolerable crop, owing to its great natural fertility; for the ſand becomes of little uſe, if the land is turned up ſoon after it is freſh laid on. This does much hurt in the country; for ſuch land, after it is let out for a long ſeries of tillage, (ſuppoſe fifteen years) is a long time recovering itſelf, and that which is ſpaddanized out of the ley, and not gravelled at all, unleſs of a moſt ſuperior rich kind, is doubly injured.

The potatoes ſhould be dug towards the end of October, or beginning of November at fartheſt, (froſty weather excepted) to make room for a crop of bere, or a crop of flax, the ſpring following; if for flax, the land ſhould get a deep ploughing before Chriſtmas, to benefit of the winter manure, ſuch as froſt, ſnow, air, &c. and a croſs ploughing in the beginning of February; and towards the end of March, it ought to get another ploughing in the track of the firſt; then the ridges to be harrowed down as fine and as flat as poſſible, and the ſeed ſown in, and lightly covered with another gentle harrowing; for the ſeed is not apt, from any cauſe that I have obſerved, to be diſturbed in the ground.

In this ſituation it ſhould be left till June, then weeded. Some weed it when four or five inches high; but treading it ſo young hurts it; and this weeding is of no uſe, for it muſt be weeded again before pulling, eſpecially in deep chiltern countries, where weeds get a-head much more than in light gravelly ſoils. In theſe the flax is always ſhorter and finer, and the ſeed in leſs quantity; but the Iriſh ſeed, though it is often impoſed for foreign, is never ſo good: for example, the firſt year's return of foreign ſeed will produce a middling good ſort of flax, whereas the ſecond return will not. To ſow the ſeed even ſhould be moſt carefully attended to: a commonly ſkilful hand will with eaſe caſt it properly, the method being ſo well known. Sixteen pecks of ſeeds at twelve quarts to each peck, is a proper quantity for an acre of good light ſoil. In my deep grounds I have known fourteen pecks to be ſufficient.

The ſeed now much uſed in Ireland is the Plantation, but the better ſort of the Baltic or Riga-ſeed I would prefer. The Dutch agrees worſt of all with our climate. The choice of it is eaſily known. The women are ſurpriſingly ſkilful in every thing that regards this plant: one of them will ſhut her eyes, put her hand into ſeveral hogſheads of flax-ſeed, and fix upon that which is beſt; but they have marks from preſſing it to oil between their fingers, ſo as to obſerve the edges, and from taſte, ſmell, and view, without requiring to make the other common experiments; whence they are ſeldom deceived; not but the merchants play them a thouſand tricks in this article, which is become very lucrative of late years, from the vaſt demands there are for it.

The heavy, pale reddiſh, or rather clear brown looking ſeed, being thick and ſhort, and oily in the feel, is the beſt. Sometimes, among ſome parcels of the ſeed, there are certain mixtures, by which predications the women immediately eſtimate the quality of it. The old Iriſh ſeed, of which quantities are ſtill ſown, is the worſt of all; the returns are extremely bad, and the flax but indifferent for uſe.

Two crops ſucceſſively are common in deep rich lands; but as flax is a great drawer, they are not the better for it, as it greatly retards their coming to graſs.

We always ſow flax after potatoes or corn, (bere) and, if proper care be taken in the preparation of the land, find it to anſwer well. How far better it may be immediately out of freſh land manured, I will not take upon me to ſay: ſome writers recommend this method; but it would never anſwer with our poor people. I have ſeldom known flax to be raiſed immediately from manured grounds: mine being rich, deep, and moiſt, and properly wrought to return a firſt crop of ſome other article, yields afterwards admirable flax. Where different ſoils can be had in the ſame diſtrict, it is needleſs to obſerve, that the richeſt and ſtrongeſt, with a clayey loam at bottom, is beſt: the nature of this plant requires ſuch, being a great drawer of the nutritive parts of the earth; but, on the other hand, there is a medium to be followed in this, as in moſt other things: land may be made too rich for flax, which will undoubtedly lodge it, that is, occaſion its prematurely lying flat to the ground: this prevents its ripening, conſequently occaſions great waſte of it, total loſs of ſeed, and what is recovered of it ma-

nufactures

nufactures but indifferently, and ſtands the teſts of uſe worſe: however, there is much of this ſort ſpun into yarn by the poor, and impoſed for good on the eagle-ſighted yarn-buyer, notwithſtanding his great vigilance.

If middling good land, whether in the ley or not, be fallowed early in the ſummer, and gets the proper tilth till the March following, when it is to be ſown, there is no doubt but it will yield an excellent and abundant crop of flax. Land cannot be ploughed too often, or made too fine, for this purpoſe. Flax ought to be ſown and pulled in dry weather.

It is ripe in my neighbourhood, generally ſpeaking, not till the beginning or middle of Auguſt, and ſometimes later, when late ſown: the better ſort of huſbandmen think it is not neceſſary to ſow it earlier than Good-Friday: about that time moſt people begin.

The poor people have ſeveral marks by which they know when it is fit for pulling: the degree of brownneſs of the colour is the chief, and is a ſufficient guide to any perſon. The men and women, promiſcuouſly ranged in a row a-breaſt, pull it expeditiouſly enough, eſpecially if they are a little refreſhed with ſome of the good things of this life, and lay it on the ſwarth. If there be danger of rain, they bind it the ſame evening into ſheaves, and ſtook it, putting commonly eight ſheaves in every ſtook. Here it is ſuffered to remain for ſome days, till it is ſufficiently dry to remove.

The poor, from neceſſity, proceed to manufacture it immediately, by rippling of the rows, and watering it, &c. But my method is as follows. After I let my flax ſufficiently ſeaſon in the field, ſo as to prevent the danger of heating, which deſtroys it, I draw it into my haggard, ſtack it, and thatch it well. Thus I let it remain till the next ſowing time, (March) when I ripple it and water it, and, if I have leiſure, proceed to dreſs it; if not, make it back into a ſtack, and let it lie ſo, without any hazard of danger, as long as convenient: or, (another way) ſoon after pulling, it may be rippled, watered, and ſtacked, ſo as to be ready for dreſſing the ſpring following. But I chuſe the former method, becauſe I thereby preſerve the ſeed, and ſell it, if I take a little care, equal to the foreign, which will go a good way in reimburſing me my expence: it is true the quantity of flax will be ſomewhat diminiſhed for remaining ſo long unwatered; but then it makes ample amends in meliorating it; for I have obſerved, that the flax thus managed dreſſes and manufactures much better, and when in linen, it wears beſt. But the impatience of our Iriſh ladies, who are the conductors of this branch, from the time the flax is over ground, till made into linen, is ſuch, that they do not reliſh delays of this ſort, though infinitely the beſt method of proceeding.

For watering flax, clear ſtagnated pools or canals, or ponds, are beſt, provided there are no fiſh, as it kills them: ſprings and running-waters muſt be avoided. To ſink it under water is proper, and let it lie about three week, more or leſs, according to the quality of the flax, and the condition of it at putting in.

About me the poor people ſtill perverſely will water it in bog-holes, becauſe they think the water cannot be too ſoft, and that the banks being unincumbered with long graſs, facilitate the drying of it.

When it is brought home (as they have no ovens) they fix a large hurdle horizontally by a ditch ſide about about four or five feet from the ground: on this they lay a parcel of flax, and underneath make a large turf fire, and keep conſtantly turning it.

They judge it fit for the brake, by rubbing a parcel between their hands, and finding the prickles to detach themſelves eaſily from the flax.

The braking is a very laborious part: it is pity that about where I live there are no engines contrived for this purpoſe, as it would ſave great expence in labour. This part of the proceſs ought, properly ſpeaking, to fall ſolely to the ſhare of the men; but the women as commonly do it, which I think very unſeemly, and ſtill more ſo to ſee a man ſcutching and hackling flax, which is equally as common with us: but the women always ſcutch mine, and I find do it beſt, as I order them refreſhment, it being merry-making time, (though but ſhort) like vintage, or ſheep-ſhearing time.

The conſtruction of the brakers I need not explain; they are ſimple engines, and known to every body. The broad ſcutch is beſt, as it hurts the flax leſs: it ought to be made of well ſeaſoned oak, to be light, that the women, who are dexterous at it, may manage it more eaſily.

A great deal depends one the ſkill of the hackler, who ought to be very expert and knowing in dividing it properly, and in arranging the ſorts according to their different fineneſs. I have had ſome hacklers manage this matter ſo well, that out of the very tow they produced I had good linen for common uſe. I had other hacklers, who, inſtead of preparing my flax to ſpin to eight or ten dozen of yarn to the pound, of which it was capable, prepared it ſo badly, as to produce me only from four to ſix dozen yarn.

To the ſpinners we keep in our houſes we generally give from thirty-five to forty ſhillings a year: theſe ſpin from four to eight dozen yarn; but if they ſpin finer, they are entitled to get a gratuity in addition, or higher wages. There are girls in plenty in the north of Ireland (where the manufacture moſt flouriſhes) who ſpin ſurpriſingly fine, and many of them with both hands at once, at wheels adapted for the purpoſe; but ſcarcely any of theſe ever come into the parts where I live.

As to the reſt, from the time the yarn is ſent to the weaver, till it is brought home from the bleach fit for uſe, it forms a particular proceſs in itſelf, and ſhall be communicated to the public, when more ample leiſure will permit. However, before I diſmiſs this ſubject, it may not be improper to make a few detached obſervations to illuſtrate ſtill more what I have already ſaid.

There are various ways to know good ſeeds which is one of our moſt eſſential objects. Firſt, To diſcover its thickneſs, by taking ſome grains, and ſqueezing them between the fingers, until the white edges of the inſide pulp or grain are forced to appear. To eſtimate its goodneſs by its weight may be eaſily done, by throwing a handful into water, and if good it will ſink quickly. To prove if it be oily, throw a handful on the fire, and if, as ſoon as it touches the coals, it burns up and crackles, its goodneſs may be depended on. But no ſeed of Iriſh growth, as I ſaid before, will thrive well a ſecond year in any of the ſoils in my neighbourhood; nor will the ſame ſoil anſwer for more than two ſucceſſive ſeaſons, without the intermediate occupation of other crops procured from manures.

As

As the culture of flax lays down land very ſmoothly and well, if you chuſe to have your land let out, you may ſow graſs-ſeeds with a light roller, or buſk, in ſome little time after your flax is in the ground: they will not hurt it; and by this means you will have a full coat of graſs the ſame ſeaſon, which otherwiſe perhaps would not be the caſe for two or three ſeaſons, flax being a great impoveriſher.

When the flax is a clear yellow, or a clear brown, ſomething reſembling a lemon colour, and begins to drop its leaves, it ſhould be pulled; but never when it is green, though often done, which is a very deſtructive method, for in this caſe it loſes conſiderably in quantity and quality, both with reſpect to flax and ſeed. Thoſe who imagine pulling it green will make it yield the finer linen are miſtaken: they need only conſult the method of the Flemings, who ſuffer it to remain the longer in ground, the finer they want it to prove for their laces, cambricks, &c. Care, however, ſhould be taken not to let it remain too long in ground, as this makes it work badly, yield bad yarn, and not bleach ſo well.

I have kept my flax in ſtack in my haggard ſome two or three ſeaſons, and never found it was damaged by vermin, though I know there are preventatives laid down by ſome writers for this purpoſe.

If the ſeaſon be moiſt, there is no ſtacking it with ſafety, till it remains unheaped a conſiderable time in the barn, as the leaſt heating is certain deſtruction to it.

No land can be too good for flax, if the ſeed be duly proportioned to it. If the crop fails on a rich and ſtrong ſoil, it has too much ſeed; for it ſhould not be ſo thick, but that every ſtem may have the benefit of the ſun and air to fortify it. *Muſeum Ruſticum, vol.* I. *page* 5.

A ſhort Account of the Advantages of the new Machinery for breaking, ſcutching, and beating Flax and Hemp, invented by Robert Macpherſon, Aſſiſtant-Secretary to the Commiſſioners and Truſtees for Improvements in Scotland.

The breaking of flax by the Dutch hand-brake (which is the beſt old method of breaking) the ſcutching with ſtock and hand, and beating with hand-mallets, being laborious, tedious, expenſive, and requiring many hands, it was thought a valuable improvement, when, ſome years ago, a water-mill was invented, by which theſe operations are performed with more eaſe and expedition. But in ſome parts of the country, a ſufficiency of water and water-fall is not to be met with; in other parts where theſe are to be had, lint-mills are not erected, on account of their heavy expence; and where-ever erected, they are found liable to the following inconveniencies. Firſt, The expence of fitting up the mill, making dams, the aqueduct, &c. and keeping theſe in repair, is great; and much damage happens by fire, and by water floods. Secondly, In Scotland, it has hitherto been found, that on account of the ſcarcity of hands, and difficulty of dreſſing in the old hand-methods, flax never was raiſed in conſiderable quantities, until the country people found the conveniency of a mill in their neighbourhood; and therefore the firſt fitter up of a mill in a part of the country where there was none before, could not for years expect buſineſs adequate to his out-lay of money. This circumſtance obliged the linen-board in Scotland to defray part of the expence of fitting up many of theſe mills. Thirdly, This mill is extremely dangerous to the workmen; many have loſt arms by it, ſome their lives, and the nature of the work there is otherwiſe remarkably unhealthy. Fourthly, This mill is ſo conſtructed, that the ſtroke of its ſcutchers is ineffectual, unleſs they are moved with a degree of violence, that nothing leſs than the utmoſt dexterity and cloſeſt care can prevent from deſtroying a very conſiderable part of the flax; and as that ſkill and unremitted attention cannot be expected among a number of common day-labourers, the great waſte of flax always attending theſe mills is eaſily accounted for, eſpecially as unſkilful hands are often employed; for being called to this work only in winter, the lint-miller muſt content himſelf with labourers that, at the beginning of the ſeaſon, are not otherwiſe engaged. Fifthly, The carriage of the rough flax to mills at a diſtance, the delay there, ſometimes for months, till others be ſerved, during which time the flax muſt lie without doors: damage, embezzlement, &c. theſe are much complained of; and, with the waſte before-mentioned, have in general ruined the character of theſe mills. Sixthly, The expence of flax-dreſſing is ſtill kept high, becauſe the proprietor of the mill muſt have a large rent, eſpecially as his outlay upon it is extenſive; the miller muſt have a living; and the workmen extraordinary wages for ſuch dangerous and unhealthy work. In ſhort, it has become very doubtful, whether, upon the whole, theſe mills have not been more hurtful than beneficial to the manufacture.

The new water-mill for dreſſing flax and hemp, invented by Robert Macpherſon, removes part of theſe inconveniencies. For, 1. It is much leſs waſteful of the flax: as much ſo, it is preſumed, as water machinery can poſſibly be. It not only yields more flax from the ſcutch, but the flax, dreſſed by it yields ſtill more from the heckle. 2. It is fitter for dreſſing long hemp. 3. It is no way dangerous nor unhealthy to the workmen. 4. It requires a leſs expenſive mill-houſe, and leſs annual repair. 5. It requires much leſs water. 6. For one, two, or a few workmen, the parts of its machinery which dreſs the flax or hemp, may be joined to the movement of a corn-mill, or any other mill, by a ſmall iron-axle, or by rope and pully, through any wall or partition, at a ſide, above, or below.

Where much buſineſs in the beating way is to be done, the new machinery with water or a horſe, gives entire ſatisfaction. But ſcutching proves an operation that requires more judicious management than can be expected at a public water-mill. A lint-miller, who dreſſes flax for others, finds his profit in the diſpatch made by the great velocity which can be given to the ſcutchers by a power of water; but the proprietor of the flax loſes more by the waſte occaſioned by that velocity than the miller gains by the greater diſpatch. In ſhort, the dreſſing of flax by any expenſive public water-mill remains ſtill liable to many of the inconveniencies mentioned in the firſt part of this paper.

The foot-machines (likewiſe invented by Robert Macpherſon) it is preſumed, obviate all theſe inconveniencies, and go far towards bringing flax-dreſſing to perfection. For, 1. They waſte the flax or hemp as little as the hand methods of dreſſing. 2. They are much more expeditious, and as much ſo as dare be attempted without deſtroying a conſiderable part of the flax or hemp, which above every thing elſe ought to be avoided. 3. The work-

ing with them is not ſo laborious as the hand methods, 4. They are not dangerous to the workmen. 5. They are not too bulky for general uſe: they are portable upon a cart, are of ſmall expence, ſimple conſtruction, can be made by any good carpenter and ſmith, and each machine is wrought by a ſingle perſon.

With theſe foot-machines any perſon may have his flax or hemp dreſſed under his own eye, by his own ſervants, and at times when otherwiſe they would be idle, in the dark afternoons of winter, when the lanthorns uſed by hecklers will prevent accidents by fire, and in the day-time when bad weather hinders working in the fields. Thus the dreſſing of flax and hemp becoming eaſy, the raiſing of theſe crops, of all the moſt profitable to the farmer, and to the country, will become more general; many will have their flax or hemp dreſſed by their own ſervants, without expence; and when others are hired to that work, the expence muſt be much leſs than by the hand methods, as the machines are greatly more expeditious. The water-mills are not taken into this compariſon, becauſe their waſte of the flax or hemp overbalances the profit of their greater diſpatch.

The importance of this new machinery to Britain, Ireland, and the colonies, muſt appear very great, when the following particulars are conſidered.

	l.
The value of the flax and hemp raiſed in England yearly cannot be reckoned leſs than —	250,000
It appears from the Cuſtom-houſe accounts, that there was imported into England, from Chriſtmas 1762, to Chriſtmas 1763, 100,997 buſhels of linſeed. In the fens about Lincoln-waſh, thirty towns and villages have yearly about 6000 acres of flax and hemp. There are likewiſe ſome thouſand acres of theſe crops yearly in the marſh-lands on the borders of York and Lincolnſhires. The town of Snaith in Yorkſhire has the greateſt flax-market of any place in Britain.	
The value of the flax and hemp raiſed in Scotland yearly is calculated about - - - -	190,000
There is imported into Scotland about 60,000 buſhels of linſeed yearly.	
The value of the flax and hemp raiſed in Ireland yearly may be reckoned about - - - -	500,000
The linen manufacture there is about double that in Scotland, and moſtly made of their own flax.	
Sum of theſe - - - -	940,000

The expence of breaking and ſcutching that 940,000 pounds worth of flax and hemp may be reckoned 150,000 pounds; one half of which, or 75,000 pounds per annum, muſt come in time to be ſaved by the uſe of the new machines; for the new ſcutcher does more than double the work of the old hand-ſcutch in the ſame time. The new brake is not ſo advantageous in that reſpect; yet the inventor thinks he errs on the ſafe ſide, when he ſtates the new brake and ſcutcher both together, as doing only double work.

The colonies in America are now encouraged to raiſe flax and hemp, by a parliamentary bounty in Britain.

The great advantages of raiſing our own ſeed, flax, and hemp, inſtead of providing them from foreign countries, need not be here repreſented. What is at preſent imported appears from the cuſtom-houſe accounts as follows: and it cannot be doubted but the aforeſaid new machinery will be the means of increaſing our own growth, and conſequently decreaſing the foreign importation.

	l.
The linſeed imported into England is annually about 100,000 buſhels, reckoned in value about - - - - - - - - - -	
Into Scotland, about 60,000 buſhels - - -	40,000
Into Ireland, about 80,000 - - - - -	25,000
Flax and hemp into England, about - - -	34,000
Into Scotland, about - - - - - - -	700,000
Into Ireland, about - - - - - - -	120,000
Sum of theſe, excluſive of the blank for Ireland	919,000

And that there can be no want of market for an extenſion of our linen and hempen manufactures (which the new flax-machinery muſt greatly promote) appears evident from the extenſive importation of theſe manufactures from foreign countries; for, according to the Cuſtom-houſe accounts, there is annually imported into England, from the continent of Europe,

	l.
Linen-yarn, of value about - - - -	200,000
Linen-cloth, of value - - - - - -	1,500,000
And thread, lace, ſail-cloth, cordage, ſacking, &c. the amount of which muſt alſo be conſiderable.	

Explanation of Plate XIV. *repreſenting the* FOOT MACHINES *for* BREAKING *and* BEATING FLAX *and* HEMP.

Of the FOOT-BRAKE.

A The three under-brake teeth, or ſwords, ſeventeen inches long, three inches deep, one and a quarter inch thick at back or bottom, a quarter of an
B inch at edge, the edges two and three quarters inches aſunder at the end next the guide B, and two inches aſunder at the other end.
C The two upper teeth, about an inch ſhorter than the under teeth.
D The brake-mallet, about thirty-three pounds Engliſh weight.
E, e. A compound foot-treadle. E is eight feet four
F inches between the fulcrums, raiſed at F eight inches above the ground (or rather five inches higher than the ſtance of the workman.) e is two feet four inches between the fulcrums, and is raiſed
G at G eighteen inches above the ground; that is, fifteen inches higher than the ſtance of the workman.
H The ſword or upright timber-rod which turns the wheel by the treadle-crank.
I The treadle-crank, of ſeven and a half inches radius.
K The fly-wheel, four and a half feet diameter, above ſixty pounds Engliſh weight. As here repreſented it is beat or caſt-iron, but it is alſo made of timber.
L Braſs cods or buſhes.
M, m The lifting crank. m is fixed firm upon the axle of the fly, while the crank M, about eight inches radius, plays freely round the axle. In poſition firſt, m begins to take round the crank (which by the lever R pulls up the mallet:) when it comes to poſition ſecond, the mallet is again at liberty, and by its weight pulls up the crank (faſter than the fixed pieces move) into poſition third.
N. B. The treadle-crank is advanced about one eighth part of the circle before the lifting crank.

a A ſmall

a A ſmall pulley which turns eaſily round on the end of the crank, and to which a rope is fixed.
O A piece of timber which prevents the rope from falling in upon the axle, but which ſhould not rub againſt the rope in its coming down.
P Here the rope paſſes between two friction-rollers, which are ſo placed that the rope comes down there four inches, or half the radius of the lifting crank, or the ſide of a plummet-line croſſing the center of the wheel; that is, to the ſide on which the crank turns when it pulls down the rope.
Q A pillar, which ſerves only to ſupport the guard for the rope O, and the friction-rollers at P.
R The lever.
S The lever-pillar.
T Part of the mallet-frame.
U Two pillars which guide the brake-mallet.
V An iron ſpring which receives the leap of the mallet, and throws it the quicker down.
W The pillars which ſupport the fly.
X,U The pillars which bear the brake-teeth and mallet.
Y Spur and croſs, ſupports of the pillars.
Z The bottom frame-piece.
a A broad ſtool upon which the workman ſtands, three inches above the ground.

The brake-teeth are made of good beech or plane-tree, the brake-mallet of plane-tree, aſh, elm, birch, or oak; the ſword, or upright timber-rod between the treadle and the treadle-crank, of beech, plane-tree, or birch; and the lever of beech, aſh, or oak. The fly-wheel, if timber, ſhould be made of oak, aſh, beech, elm, or plane-tree. All the other parts of timber worth mentioning may be made of fir.

Of the FOOT-BEATERS.

The before-mentioned brake may at any time be converted to a beater of flax and hemp, by removing the brake-teeth, and putting in their place flat boards. In the upper of theſe boards may be driven thirty-two nails, the head about three quarters of an inch long, and the point of the head about a quarter of an inch diameter; the points of the nail-heads may be placed one inch clear aſunder, and in the order marked B, at equal diſtances, as in this way any of the nails may moſt eaſily be drawn out in repairing the mallet. An iron hoop about the mallet will prevent its burſting with the indriving of the nails.

For the ſole purpoſe of beating flax and hemp, the narrow end of the mallet is placed towards the workman; and where there is much work in that way, the mallet and fly may be made heavier, and then two or more workmen can work together upon the foot-treadles, which may alſo be made equally long.

Plate XVII. Fig. 1. repreſents the ſcutching machine, where *b* B G is the foot-board; D, D, ſcutchers; Q, the center of the iron wheel C, C, Q; S, the upright piece, or ſcutching ſtack; A the piece on which the hand reſts in order to ſcutch the flax. The machine is put in motion by the nunch at M, which is moved by the foot-board.

We have been the more particular in our account of the various methods uſed in cultivating and dreſſing flax, becauſe it is an article, which, with proper encouragement may become of the utmoſt importance to theſe kingdoms; and therefore, we were perſuaded that we could not do a more acceptable piece of ſervice to the huſbandman, than by giving the various methods at full length, though we are conſcious that in doing this the reader will meet with ſome repetitions, which could not be avoided without curtailing the whole, and conſequently rendering it leſs valuable.

FLAYL. *See* FLAIL.

FLEABANE, or *Fleawort*, the name of a perennial weed common in paſtures, the ſtalk of which is round, bending, ſolid, and heavy. The leaves are oblong, ſharp-pointed, wrinkled, downy, and embrace the ſtalk, on which they grow very thick without any regularity. The flowers are yellow, radiated, and incloſed in a flower-cup, made of narrow ſcales like briſtles.

FLEAK, a gate ſet up in a gap.

FLEAWORT. *See* FLEABANE.

FLET-MILK, milk that has been ſkimmed, or had the cream taken off.

FLOATING *of Meadows*. *See the article* MEADOW.

FLOTE-FESCUE *graſs*, an excellent graſs for cattle, growing in watery places.

The flote-feſcue affords excellent feed for horſes. Mr. Stillingfleet, quoting a piece publiſhed in the Amæn. Acad. vol. III. entitled *Plantæ Eſculentæ*, takes notice, that the author of it ſays, article 90, "That the ſeeds of this graſs are gathered yearly in Poland, and from thence carried into Germany, and ſometimes into Sweden, and ſold under the name of manna-ſeeds. Theſe are much uſed at the tables of the great, on account of their nouriſhing quality and agreeable taſte."

Our ingenious countryman, in his addition to this paſſage, has the following words: "Mr. Dean, a very ſenſible farmer at Ruſcomb, Berkſhire, aſſured me, that a field, always lying under water, of about four acres, that was occupied by his father when he was a boy, was covered by a kind of graſs that maintained five farm-horſes in good heart, from April to the end of harveſt, without giving them any other kind of food, and that it yielded more than they could eat. He, at my deſire, brought me ſome of the graſs, which proved to be the flote-feſcue, with a mixture of the marſh-bent. Whether this laſt contributes much towards furniſhing ſo good a paſture, I cannot ſay. They both throw out roots at the joints of the ſtalks, and therefore are likely to grow to a great length. In the index of dubious plants, at the end of Ray's Synopſis, there is mention made of a graſs, under the name of *gramen cannium ſupinum longiſſimum*, growing not far from Saliſbury, twenty-four feet long. This muſt, by its length, be a graſs with a creeping ſtalk; and that there is a graſs in Wiltſhire, growing in watery meadows, ſo valuable, that an acre of it lets for from ten to twelve pounds, I have been informed by ſeveral perſons. Theſe circumſtances incline me to think it muſt be the flote-feſcue; but whatever graſs it be, it certainly muſt deſerve to be enquired after.

"There is a clammineſs on the ear of the flote-feſcue when the ſeeds are ripe, that taſtes like honey, as I have often found; and for this reaſon, perhaps, they are called manna-ſeeds.

"Linnæus Flor. Suec. article 95, ſays, that the bran of this graſs will cure horſes troubled with bots, if kept from drinking for ſome hours." So far the very ingenious Mr. Stillingfleet.

From what has been ſaid above, we may conclude, that the flote-feſcue is one of the beſt graſſes that we can cultivate for the uſe of our horſes, and that more eſpecially, as it appears to thrive beſt in wet, low meadows, where many other graſſes would not grow.

There are at Clacton-Lodge, in the county of Eſſex, not far from Thorp, ſome low meadows, which are every year flooded for months together during the winter ſeaſon: theſe meadows are covered with a graſs of a remarkable fattening quality; for when old cows have been turned into them, though they were ever ſo poor and low in fleſh, they have in a very ſhort ſpace of time grown as remarkably fat; and when killed, their meat would appear as fine, and taſte as well as that of any ſteer or ox; therefore it is reaſonably to be ſuppoſed, that the graſs growing in theſe meadows is no other than that of the ſlote-feſcue.

FLY, in turnips. *See* TURNIPS.

FLY, in ſheep, a ſpecies of maggots very troubleſome to that animal. The reader will find an infallible method to deſtroy theſe troubleſome inſects under the article SCAB *in Sheep*.

FOAL-TEETH. *See the article* AGE *of a Horſe.*

FODDER, hay, ſtraw, haulm, &c. given to cattle.

In the foddering-yards of backſides, or other outhouſes, to have ſeveral diviſions, over and above what is conſtantly uſed, has great conveniencies in it; one of which is, that in them you may diſpoſe of a two-yearling cow, or another cow, at the time of bulling; not only to keep them from a bull, but from the other beaſts alſo, that would be leaping ſuch a cow, whereby they may hurt each other, &c. eſpecially cows forward with calf will be apt to warp by leaping a bulling-cow.

The open winters make hay the deareſt, if a hard froſt and ſnow come at the fore-hand of them; for if once cattle come to fodder, they muſt be held to it, or they will receive great damage. In waſhy weather all the hay that can be given to cattle will not make them thrive, but in dry froſty weather they will thrive with their meat very well.

Mr. Liſle ſays, that he let his cows go at large from their foddering-yard, during the winter, and ſo continued till April, when they fed on ſome graſs; and thoſe that had calved, he foddered with hay: the conſequence of which was, that by the middle of April his cows would not ſtand to eat any ſtraw at all, but were, during the months of March and April, ſo weaned from ſtraw, by baits of graſs and hay, that they fell off from the ſtraw quite, and grew much leaner, and worſe in fleſh than they had been, and apparently worſe than the farmers cows, which were, after the winter months, wholly pent up to their ſtraw, and to the pond.

All ſorts of cattle that chew the cud, as ſheep, cows, &c. care not to graze after each other, nor to eat one another's leavings in the foddering-yards, but cattle that do not chew the cud will eat after thoſe that do, and *vice verſa*.

Pliny tells us, where hay was ſcarce, it was uſual to feed their cattle with chaff and barley-ſtraw. Of chaff, ſays he, that is the beſt ſort, which is the thinneſt and ſmalleſt, and neareſt to duſt; the beſt therefore is from millet, the next from barley, and the worſt from wheat, except it be for hard-labouring beaſts.

On ſound experience I am convinced, ſays Mr. Liſle, that in our hilly-country we ought not to have any dependence on ſending our cattle out of the foddering-yard to graſs before the middle of May, and therefore we ought to be provided with winter-fodder for cows accordingly.

At the beginning of winter, ſuppoſe the latter end of October, and a great part of November, while cattle ſtill continue out in the field at graſs, it is very neceſſary to fodder them early in the morning, while the hoar-froſt hangs on the graſs, which they will not eat kindly off till the ſun has warmed it.

The ſtraddling racks are beſt for foddering, if made ſtrong enough, that is, ſo as not to be over-turned; for theſe racks may be lifted up as the dung mixen riſes, which thoſe fixed in the ground cannot be.

It is a practice in many places, to tie their cows up to a rack to fodder; but if a perſon would rightly conſider the places where it is done, we ſhould find it only uſed where the fodder is good, being either hay, or very good ſtraw; but in the hill-country of Hampſhire, where the cattle have ſtraw fodder only, and that not ſo good as the ſtraw in the valleys, the cuſtom is to fodder their cows in racks, or cribs, in the open yard, which they think better than tying their cattle up to racks in houſes; for though in cold and rainy weather the houſes may keep their loins dry, yet in countries where the fodder is coarſe, eſpecially after wet and backward harveſts, when the ſpirit of the ſtraw is waſhed out by the rain, the giving cattle ſtraw from racks, from whence they cannot pick and chooſe, as from cribs they may, is judged to tend to the impoveriſhing the cattle, whereas in cribs they can pick the ſweet from the coarſe.

There is a very remarkable difference in cattle eating their fodder, when freſh threſhed, and when it has been threſhed two or three days, eſpecially if the ſtraw be but indifferent fodder. *Liſle's Huſbandry, vol.* I. *page* 392.

FOGGE, long graſs remaining in paſtures till winter.

FOISSEN, the natural juice or moiſture of the graſs or other herbs.

FOLD, the moveable incloſure wherein ſheep are confined during the night.

It appears that the ſheep-folds of the eaſtern nations were not ſuch as ours, but houſes erected for that purpoſe.

Mr. Garret, who has lived four years in Spain, ſays the ingenious Mr. Liſle, aſſures me, that in thoſe parts where he was, they fold their ſheep as we do ours, only their fold is made netwiſe with ſtrong cords, and about ſix feet high, with the bottom ſtaked down to the ground, and two cur-dogs, of a breed between a maſtiff and a greyhound, lie within the fold to guard the ſheep from the wolf.

"In favour rather of keeping a weather-flock than an ewe-flock on the hill country, beſides other conveniencies, you may have the benefit of the fold for barley at the principal time when it does moſt good, viz. on the fallows between the latter end of February and the middle of April, when the ewes cannot be folded.

"The limitation of an ewe-flock for folding and keeping on throughout the winter, or be it a weather-flock, ought to depend on theſe rules; Firſt, Not keep more at winter than you can winter, either by meads, or ſowed graſſes and hay. Secondly, Not to be ſatisfied that you can provide hay for them by ſowed graſſes, as broad clover, &c. in caſe ſuch lands as are fitted to carry ſuch graſſes, lie at a diſtance for mowing, whereby you muſt maintain them with dung, where, by reaſon of carriage, it will be chargeable, unleſs your fold can maintain more ground than

than your out-lying lands to your farm, which, in the hill country, is not likely: and to carry but ſeven or eight pots of dung in a day, by reaſon of the diſtance, and mowing, is not reaping a profit, but bare exchanging: but if you have much land round about, and near your houſe, whereto you can carry thirty or forty load of dung a day, and which will bear broad clover hay, then you may increaſe your flock proportionably.

"As to fatting your ewes and lambs out of your flock, if you have lands diſpoſed for fatting, you ought to conſider, if you break your flock by drawing out ewes with their lambs for that purpoſe, what flock you will have left to fold on your wheat fallows, and how far your wheat land ſtands in need of a fold; for if you leave yourſelf not ſufficient, it will be indiſcretion to weaken your fold; beſides, it will hurt your breed; for you will draw off many forward lambs, which might, perhaps, have carried on the breed otherwiſe, and when a hill country farmer is ſettled in a flock, it is not good to be buying yearly, to keep up his complement, on account of many dangers which may from thence enſue: it is better, therefore, in ſuch caſe to buy ewes with their forward lambs to put into your fatting grounds; but in caſe you ſow wheat-land good enough without the fold, or have another way of manuring it, by liming, &c. then it may be very well to fat off certain numbers of your flock.

"Though, ſays a very good farmer of my acquaintance, I have but a mean opinion of winter folding, or to fold on barley ſown, and may in time fallow on graſs-ground inſtead of barley-land, yet I would fold on barley-land fallowed or ſtirred, from the time my lambs were ſtiff enough after lambing to go on ſuch fallows; for, ſays he, the benefit of an acre ſo folded, is three times as good as one winter-folded for barley.

"Farmer Glyde, of the Iſle of Wight, with whom I was talking of huſbandry affairs, told me, there was one thing he believed I knew not of, which he would tell me; he would, he ſaid, adviſe me to fold my ewes and lambs on the barley-land in the ſpring, and divide my flocks in folding; for, ſaid he, two hundred ewes and their lambs will do as much, if not more good, by folding on an acre of land, as four hundred weathers: I have, ſaid he, folded a part of the ſame land at the ſame time two hundred ewes and their lambs, and in another fold of equal dimenſion five hundred weathers, and I have always found, that the folding of the ewes did me the beſt ſervice, and brought me the beſt corn.

"My ſhepherd is of opinion, that ewes ought not to be folded on the barley fallows, or any other fallows in lambing-time, but weathers only; for the lambs, being wet, when lambed, would be dirtied with the fallows, and the ewes would preſently forſake them; therefore the ewes ought in lambing-time to be folded in the meadows, where it is clean, and the folds removed as often as the cold wind ſhould change from corner to corner. And afterwards, he ſaid, they ought to fold weathers on the barley till a fortnight after May, but the ewes never after Candlemaſs.

"It is plain, that the early folding an ewe-flock, and lambs in April, on wheat-fallows, pinches the lambs, and ſo does folding them at that time on the barley grounds, both which are too cold for them, eſpecially on our hill country; care ought therefore to be taken, that thoſe lands do not of neceſſity want folding on in thoſe months, but that they may be otherwiſe provided for, and that during that time the ewe-fold may be on graſs-grounds, or lay-grounds deſigned for fallows.

"We muſt be more cautious in April and May of folding an ewe-fold on the barley-land, they being wettiſh, than of folding them on the wheat ſown in Auguſt or September; becauſe the lambs in April and May make the ewes riſe often and move, whereby the ground becomes much more trodden at that time of the year by the ewe-fold, than it would be by a weather-fold, or an hog-fold, as may apparently be ſeen, if the folds be divided.

"Telling Mr. Gerriſh the grazier, and farmer Iſles, how dear Mr. Eyres our miniſter ſold fat lambs to the number of fifteen, May eighteenth, viz. for ten ſhillings and ſix-pence each, and that they had been folded all along to the very day he ſold them: they replied, that folding the lambs did very little hurt them with reſpect to their fat, provided they were drove pretty late to fold, and let out early in the morning.

"Walking with Mr. Raymond into his arable common fields, October twenty-fifth (anno 1708) we met his ſhepherd pitching the fold on the new ſowed wheat. I aſked him, whether he did not find that pitching the fold on the wheat at this time of the year, and a fortnight later, turned to a much better account than folding for the barley crop for the year foltowing. Mr. Raymond and his ſhepherd readily replied, undoubtedly it turned to the beſt account to fold after this time on wheat. I ſaid, for my part, I had obſerved the fold carried on the land, deſigned for barley ſo early in the winter had little effect, its ſtrength being ſpent and waſhed away by ſpring, ſo that it will make but little ſhew in the crop of barley next ſummer, and that therefore I choſe to preſerve four, five, or ſix acres of wheat-fallow that lies warm, and will bear ſowing late, to carry my fold over to the latter end of October, rather than finiſh my wheat fold by the end of September, and then carry it on my barley; for though the latter part of October might, in our cold country, be too late to ſow wheat, yet it was better than to be ſo ſoon folding barley, which would be no better for it. To which they replied, I was much in the right. And as I have before obſerved how inſignificant the fold is in the winter, eſpecially in hards froſts, I imparted it to Mr. Raymond, who concurred with me, and ſaid, he had folded on arable land in ſnow, and found not the leaſt benefit: whereupon he reſolved in ſuch caſes to fold on meadow and paſture, in mighty expectations of graſs: but it made no return; wherefore in ſnows he now lets ſheep ramble.

"Whereas I have ſaid, that in cold clay-ground, and in a cold hill country, a winter-fold does little good; yet I have by experience found the contrary in ſuch parts of the hill country, where the land is dry and light, and that it does great ſervice to the barley-crop. This difference may be reconciled thus, i. e. where the land, though called hill country land, does not lie very high, for the height much tends to the chilling of the ground. Again, the explanatory reaſon of this difference, though hardly accountable for, yet ſeems to me chiefly to lie in the chilling quality of the ground which at firſt receives the dung and piſs, and that deadens the ferment; whereas in warmer ground its progreſſion toward that end is ſupported by a ſufficient benign warmth, ſince in both ſorts of earth, the urine does undeniably ſink into earth, and mix with it.

"My ground being cold and feeding, I ſhould in the ſpring of the year, when I come either to pitch my fold, on

on the barley fallows, or on the ſown barley, ſet it very wide, in order to avoid the uſual inconveniencies of penning at that time, viz. the rankneſs and lodging of the barley, and the conveniencies, thinneſs and coarſeneſs.

"It was the tenth of October (anno 1720) when my fold was going to be ſet on the wheat-fallows of a field, which was heavy land, and the fallows, where the fold was to go, were to be ploughed up the next day; I was afraid the land would be too wet to fold on after the wheat was ſown, and ſpoke to the ſhepherd about it. He ſaid, he believed I might be in the right, eſpecially ſince the rams have been ſome days put to ramming the ewes, becauſe the rams would keep moving and ſtirring the ewes all night in the fold, whereby the ground would be battered and trod, and ſo ſquatted, that the wheat might not get through.

"That the Greeks did pen up their ſheep, that they might piſs through hurdles, as in Herefordſhire, you may ſee in Palladius's calendar, November, to avoid dirtying and damaging their fleeces.

"Farmer Miles, whom I have often mentioned with approbation, adviſed me, if I would turn arable into meadow, and lay it up to graſs, to fling ſtraw upon it that is leſs than half rotten, and then fold upon it the ſame night, and it will bring the ground on very faſt.

"Purſuant to what has been before ſaid, that folding in winter for barley is not profitable, becauſe, by waiting for the fold's running over the land, we loſe the principal ſeaſon for fallowing; yet however it may be proper to fold till Chriſtmas, and then go on the wheat-lay; becauſe we can loſe no fallowing ſeaſon by that; we cannot well have finiſhed our fallowing any year before Chriſtmas.

"I find by Mr. Antill and Mr. Clerk, and others, that in Leiceſterſhire they have no winter-folding for barley; they leave off by Michaelmas at fartheſt, and ſometimes cannot fold again till May; the reaſon is, their lands are ſo wet they would be always in a poach, and the coldneſs of the lands would kill the ſheep: to help which defect, they muck their barley-lands, and from thence begin their huſbandry, and ſow wheat the year after, often under furrow, on their barley-ſtubble, for they ſay, if they ſhould dung their wheat-ground it would rot their wheat, and they ſow peas and beans after the wheat, and then lay the ground to ſummer-fallow again, to be mucked in May for barley, or to fold for wheat; ſo that they carry out their dung before it is half rotten, or the ſeeds of the weeds killed: but in their incloſures they ſow four crops of corn all on one earth, without dung, for the moſt part beginning with oats, and laying down to graſs with wheat.

"I am told that in Dorſetſhire the aim of the farmers is, to fold on their ſheep-leaſes in the middle of July, and ſo till Michaelmas, that in the winter there may be a good head of graſs for the milch-ewes.

"It ſeems to be inconvenient to graſp at ſo large a wheat or barley-crop, as hardly to be able to compaſs it without folding late on the wheat after it is ſowed, or on the barley land after it is ſowed; for by being under the above neceſſity, in order to compaſs what one has engroſſed, one may often be obliged to fold unſeaſonably on each ſort of corn, nor will the fold in that caſe make good the damage done to the flock by the lateneſs of the ſeaſon: and an ewe-fold is often damaged by folding on the cold land at the latter end of October; whereas it is better to come early with your fold off of the wheat-lands on to the barley ley-grounds, and from the ſowed barley on to the wheat-fallows; for thereby you will fold the ſame quantity of ground of the reſpective grains without the reſpective inconveniencies.

"Between waſhing and ſhearing-time ſheep ought not to be folded, becauſe of dirtying their wool, nor from the cutting of the lambs till a fortnight after, nor in ſheap-leaſes or arable in wet weather, for it will tread the graſs into dung.

"A ſervant of mine, a man of very good underſtanding, tells me, he has been many years a ſhepherd, but could never obſerve that the fold ever did any good in froſty weather: particularly he remembers a very ſharp froſty winter, in which a whole flock uſed daily to gather to a hay-reek, in a ground where they were foddered, yet he could not obſerve there was any better corn there than elſewhere. I aſked him the reaſon of it; he ſaid, the froſt waſted and preyed on the dung; and I rather approve this obſervation of his, becauſe of the great prejudice ſtrong beer and ſpirits receive by being frozen, even ſo as to become mere *caput mortuums*.

"If froſt has the ſame effect on dung, by impoveriſhing it, that it is ſaid to have on the ſheep-fold, and on ſtrong beer: quere, whether it be proper or not, to leave horſe or cow-dung ſpread on land without ploughing it in?

"Mr. Raymond is alſo of opinion, that the winter-froſts do very much deaden the folding of the ſheep, and rob it of its virtue.

"Farmer Elton ſaid, the method he beſt approved of in folding, was always to fold that land firſt that was firſt deſigned to be ploughed, ſuch as white or whitiſh land, they not being apt to bear weeds, nor will the fold be apt to cauſe weeds to come, and ſuch land he would ſow firſt, viz. at St. James's-tide. I ſaid, I ſhould think, though ſuch land ſhould be ſowed ever ſo wet, yet, if the month of Auguſt ſhould prove dry and ſcorching, it would burn, and ſuffer by ſuch early ſowing. He replied, if ſowed wet, yet ſo as it came up, he never knew the drought to hurt it.

"It was a very dry ſeaſon from the firſt of March to the ſixth of May (anno 1701) during which time I ſet my fold on my barley. Several of the farmers in my neighbourhood ſaid, it would be apt to do the barley more harm than good, for the ſheep would ſcratch up the ſeed; whereas, if rain had come, ſo that the ground had not been in a duſt, their ſcratching would have done no harm. But I rolled before I ſet my fold, and ſo I preſume the ground was ſo faſt as to receive the leſs damage, it being alſo ſtoney, and therefore the ſheep could not ſcratch it ſo much as otherwiſe perhaps they might have done: the event was, the fold did no harm, but good.

"Mr. Gilbert of Maddington was telling me, the way of huſbandry about him, near Saliſbury, was, to fold on their wheat after it was ſowed till St. Luke's-tide, which is in the middle of October; then to draw off their flock for a month to fold their ſheep-leaſes, and then on the barley-fallows. I aſked ſome North-Wiltſhire farmers, if about them they ever folded on the wheat-land after it was ſowed; they ſaid no, they never knew it to be done in any parts thereabouts, yet folding after the corn was ſown did it more good than before; but the reaſon why they did not do it about Holt, &c. they believed was, becauſe they were forced to lay up the wheat-lands in high ridges by reaſon of the deepneſs of the earth, and its wetneſs, and

and the ſheep if folded on ſuch land, would do nothing but lie between the furrows, which would do the land but little ſervice: beſides, they ſaid, in the hill-country the land was rather of the lighteſt, and the treading of the ſheep, after it was ſowed, preſſed it cloſer than it was before, and ſo did it ſervice.

"Mr. Raymond aſſured me, that ſheep folded on ſandy lands would thereby be ſenſibly more impoveriſhed than thoſe folded on clay lands, and this, ſaid he, the ſhepherds agree to, who live where there are ſuch different ſorts of land. The reaſon ſeems to be, becauſe the ſandy lands draw forth and drink up the moiſture of the ſheep to fill up which emptineſs of the outward veſſels, a freſh juice muſt ſucceed, and ſo on; or elſe that the ſandy lands being hot, make the ſheep perſpire more than clay-lands do, whereas the cold clay rather repels perſpiration.

"If ſandy or light ground, as has been before hinted, draws the fat and moiſture of the ſheep-fold off, ſo as to impoveriſh a flock more than if they had been folded on cold clay-lands, it muſt be allowed, on the other hand, that light ground may be better enriched by a fold than heavy land, becauſe the light ground imbibes more of the moiſture and fat of the flock; and this gives ſome account why it is ſaid, poor lands often pay better for their folding than ſtrong lands: for the ſame ſame reaſon winter-folding, when the ground is wet and cold, holds no proportion to ſummer-folding.

"Diſcourſing with farmer Biggs on huſbandry, he ſaid, he folded on the fallows all winter long, though never ſo wet; yet, ſaid he again, ſometimes the fold does harm: let it be never ſo wet, ſaid he, early in the year, folding on the fallows does no harm; for, in the firſt, there is heat enough in the ground at the firſt hand of the year to keep off the chill, and then the ground is not ſo ſettled, but that the rain ſoon runs through it, but at the latter end of the year the ground is ſettled; then treading it with the fold in wet weather makes it hold water, by which it may be chilled, and kneads the very wet into it, whereby there will be the leſs corn.

"Before I came from Crux-Eaſton in February (anno 1698) in order to go into the Iſle of Wight, I had a diſcourſe with an old experienced ſhepherd about folding the flock on fallows: he ſaid, as to wheat, it was excellently good, but they rarely folded on barley-land after it was ſowed, for if it was a whitiſh land, and a hot ſummer came, it would be burnt up: beſides, the ſheep would be ſcraping at that time of the year on barley-land, and would take the corn out of the ground; but the wheat, ſaid he, lays too deep for them to do ſo. But when I came into the Iſle of Wight, farmer Collins was of a different opinion, and ſaid, he had always folded with good ſucceſs on hot, dry, ſandy ground after it was ſown with barley, and was earneſt with me to try it; for, ſaid he, you will quickly ſee the benefit, and though the ſheep ſhould ſcrape, you will find the barley come thickeſt there. There is land, however, about Huſborne and Stoke in Hants, that will burn by folding on in the ſpring, and get more harm than good, if hot weather come, it being a hungry ſharp gravel.

"As it ſeems to me, the double folding on the early wheat-fallows, to be ſown on one earth, cannot occaſion the roots of the graſs ploughed-in to ſhoot up afreſh, but rather prevents it, by treading the earth down into a hard plaiſter, ſo that they cannot riſe; it is true, it may bring up afreſh new graſs, which, having weak roots, will eaſily be torn up by the draggs.

"Columella, ſpeaking of feeding ſheep, ſays, there is no ſort of land, or food, but what (by the continual uſe of that only) ſheep will be tired of, unleſs you give them ſome ſalt now and then to lick, from whence they may procure a new appetite to their meat and water. All the ſummer time during the hot ſeaſon they muſt be let out to feed as early as may be, while the dew is on the graſs; and when the ſun is about four hours high, they muſt be led to water and under the ſhade, and again to feed towards ſun-ſet. In the dog-days the flock ſhould be ſo led as to feed with their heads towards the weſt in the forenoon, and towards the eaſt in the afternoon; for it is of great conſequence, ſays he, that the ſheep's-heads ſhould be turned from the ſun, which would be hurtful to them. And Varro gives the ſame directions, becauſe, ſays he, the ſheeps-heads are extremely ſoft. Perhaps this may be the chief reaſon of the rams and ewes in companies turning face to face, in hot ſun-ſhiny days. During the winter, and early in the ſpring, they ſhould be kept in their fold, till the ſun has melted the hoar-froſt from the graſs, which would occaſion rheums in their heads, and would alſo ſcour them: for this reaſon in cold wet ſeaſons of the year they ſhould be watered but once a day. They let their ewes, as Varro aſſures us, go out to feed with the reſt of the flock, but kept back the lambs, which were ſuckled by the ewes at their return, and then again ſeparated from them. They alſo tethered their lambs at ten days old, leſt they ſhould diſlocate or hurt their tender limbs by playing together." *Liſle's Huſbandry, vol.* II. *page* 178.

FOLE-FOOT, the ſame with colts-foot. *See* COLT's-FOOT.

FOOD, a general name for whatever aliments are taken into the body to nouriſh it.

FOOD *of plants*, the particles they extract from the ſoil, air, &c. in order to their nouriſhment.

Philoſophical inquiries into the principles of vegetation, and the manner in which it is performed, are an object well worthy the attention of gentlemen whoſe ſituation allows them to purſue that truly uſeful and entertaining ſtudy. But as the induſtrious huſbandman, for whoſe benefit this work is chiefly intended, as a compendium of the beſt practice in agriculture, founded on the reſult of experience, cannot afford time for matters of ſpeculation; nor would they, in point of prudence, conſiſt with his neceſſary occupations, even if his education fitted him for ſuch reſearches; it may be ſufficient for him to form a general, but juſt, idea of the means by which plants are moſt ſucceſsfully raiſed. A proper notion of this will help to guide him in the management of his lands, and ſhew him in what ſtate the earth ſhould be, to enable the plants which he cultivates moſt eaſily and readily to find their neceſſary food. This general knowledge of the baſis of agriculture is even requiſite in every one who would be ſatisfied of the reaſonableneſs of his methods of proceeding.

Whether any one active principle does univerſally nouriſh all plants, or whether ſome particular ſalts or juices feed one plant, and others another, is a queſtion, hat has been warmly debated by philoſophers.

The ancients generally entitled the earth to the production of the animals, vegetables, and other bodies, upon and about it; but ſeveral of the moderns, and among hem ſome of very great name, both here and abroad, ave declared in favour of water, as the efficient cauſe of

vegetation.

vegetation. Lord Bacon was of opinion, that, "for the nouriſhment of vegetables, water is almoſt all in all: and that the earth doth but keep the plant upright, and ſave it from over heat and over cold." Others carry this hypotheſis ſtill farther, aſſerting water to be the only principle or ingredient of all natural things. They ſuppoſe that, by I know not what proceſs of nature, water is tranſmuted into ſtones, into plants, and, in ſhort, all other ſubſtances whatever. Van Helmont, and his followers, to whoſe opinion even the illuſtrious Mr. Boyle has ſhewn a ſtrong propenſity, are very poſitive in this, and alledge, as proofs, the conſiderable growth of mint, and ſeveral other plants, in water, and his well-known experiment on a willow-tree. Van Helmont planted this tree, which weighed five pounds, in two hundred pounds of earth dried in an oven, and watered it with rain, or diſtilled water, after carefully covering the caſe in which it ſtood with a perforated tin cover, to prevent the admittance of any other earth. Five years after, weighing the tree, with all the leaves it had produced in that time, he found its weight amount to one hundred and ſixty-nine pounds three ounces; while the weight of the earth was only diminiſhed about two ounces.

Mr. Evelyn thought, with the learned Dr. Sharrock, whom he quotes, that water is, of its own conſtitution alone, a ſoil to vegetables, not only as the moſt genuine vehicle of the riches which it imparts to plants, through the ſeveral ſtrainers, and by means of which all change and melioration is effected; but becauſe it is, of all other ſubſtances, beſt diſpoſed for ingreſſion, to inſinuate into, and fertilize the earth; which is the reaſon why floated grounds are ſo remarkably fertile after the flood has ſubſided. "It is, ſays he, the neareſt of kin to the whole vegetable race; for to aſſert, with any confidence, what part of the mere earth paſſes into their compoſition; or whether the earth ſerves only for ſtability, or as a womb and receptacle to their ſeeds, I ſhall not undertake to diſcuſs; though I do not yet conceive the earth to be altogether ſo dull and inactive, as to afford no other aid to the generation of what ſhe bears; the diverſity of ſoils being infinitely various, and the difference of inviſible infuſions far beyond our arithmetic. But neither do I here by any means exclude the air, nor deny its perpetual commerce and benign influences, charged as it comes with thoſe pregnant and ſubtile particles, which pervading and inſinuating into the earth's more ſteady and leſs volatile ſalts, that inteſtine fermentation is begun and promoted, which gives life, growth, and motion, to all that ſhe produces. Dr. Mayow has proved, that the moſt exhauſted and worn-out mould, is repaired by a bare expoſure to the air alone, without which it produces nothing. Nor can plants, totally excluded from the air, live, or ſo much as erect themſelves to any thriving purpoſe, as being deprived of that breath and vital balm, which no leſs contributes to their growth and nouriſhment than does the earth itſelf, with all our aſſiſtance. Beſides, we find that the air is near of kin and affinity to water, and indeed ſeems as it were but a thinner water; for how elſe are vines, and other trees of prodigious growth, maintained among barren rocks, and thirſty pumices where rains but ſeldom fall, if not from the benign influences of the air?"

To this aerial food and moiſture it is that moſt of the ſedum kind owe their growth. Succulent groundſel, and the fragrant wall-flower, draw their nouriſhment from the ſame ſource. An aſh now growing out of a wall of the abbey-church at St. Alban's, affords a remarkable inſtance how much even trees are nouriſhed by the air.

As all kinds of water, as well as air, contain many other ſubſtances beſides the pure elements of water and air, it is difficult to aſcertain whether theſe extraneous ſubſtances, or ſome of them, are not the food of plants. Dr. Woodward's experiments, as related in the Philoſophical Tranſactions, ſeem to confirm the opinion that they are: for he obſerves, that a great part of what he calls terreſtrial matter, mixed with the water in his experiments, aſcended up into the plant, as well as the water; and that the plants were more or leſs nouriſhed in proportion as the water in which they ſtood contained a greater or ſmaller quantity of that matter. With regard to Van Helmont's tree, and the growth of plants in water, he very juſtly obſerves, that nothing like what the advocates for water would infer from thence, can poſſibly be concluded from any ſuch experiments, unleſs the water uſed in them be abſolutely pure, homogeneous, and not charged with any ſort of terreſtrial mixture, to which the plant may owe its growth and increaſe: for that all water, even the cleareſt and moſt tranſparent, does abound with ſuch matter, will appear to any one who ſhall put ſome of the very pureſt into a clean glaſs phial, and ſtop it with the greateſt care. Though perfectly tranſparent at firſt, it will grow cloudy, if ſuffered to ſtand ſome time without being ſtirred, and at length depoſite an opaque ſediment. Filtering and diſtilling will indeed intercept ſome of the earthy particles with which it is naturally charged; but neither of theſe operations, nor any other that we know of, though ever ſo often repeated, will free it entirely from all extraneous matter, ſome of which will always remain in it, very fine and light, fit to attend every motion of the water, whoſe extreme tenuity, and exactly ſpherical globules, enable it to pervade ſmaller ducts than even imagination can conceive. We hardly know any fluid in all nature, except fire, whoſe conſtituent parts are ſo extremely ſubtile as thoſe of water. They will paſs through pores and interſtices, impervious to air, or any other fluid. This enables them to enter the fineſt tubes and veſſels of plants, and to introduce the nutritive matter lodged in the earth, conveying it to all parts of them; whilſt each, by means of organs it is endowed with for the purpoſe, intercepts and aſſumes into itſelf ſuch particles as are ſuitables to its own nature; letting the reſt paſs on through the common ducts.

The judicious Mr. Worlidge, uninfluenced by the new and prevailing mode of thinking in his time, according to which all vegetables were ſuppoſed to be fed by water only, declares poſitively, that he cannot but explode this opinion as deſtitute of foundation; for that, although ſeveral plants ſet in water only, do emit fibrous roots, and flouriſh therein for a time; yet, at beſt, this nouriſhment is but weak, becauſe water does not contain a ſufficient quantity of the true nutritive particles, as the willow, poplar, and other aquatic plants raiſed therein, demonſtrate, and as is ſtill farther evident from their better thriving if the water be often changed. "Experiments, ſays he, have been made of gourds and cucumbers, planted in baked earth, and watered with water only; and after they have grown to ſuch a bulk as the experimenter thinks proper, they are weighed, and alſo the earth, which laſt is probably but little diminiſhed, or perhaps not at all; from whence they conclude, that the ſubſtance of thoſe vegetables

vegetables proceeded from the water. Thus have men made experiments ſpeak as they would have them, to favour the new opinions they would impoſe on the credulous.

Spring and rain-water contain pretty near an equal charge of vegetable matter; river-water more than either of them. Nor can any doubt be made, but that the water which falls in rain at ſome times, is more charged with particles fit for the vegetation of plants, than that which falls at others. A more powerful degree of heat muſt draw up a larger quantity of that matter, with the humid vapours which form rain, than a more feeble warmth poſſibly can. The water of one ſpring may alſo flow with a higher charge of this matter than that of another: this depending partly upon the briſkneſs of the ebullition of the water, and partly upon the quantity of that matter latent in the earth, through which the fluid paſſes, and the greater or leſs laxity of that earth. For the ſame reaſon, the water of one river may abound with it more than that of another; and the ſame river, when much agitated, may bear up more of it than when it moves with leſs rapidity.

Though water be not itſelf the food of plants, it is an abſolutely neceſſary agent, by which the matter proper for their nouriſhment, which remains inactive till it be diluted by, and incorporated with this fluid, is conveyed to them, and introduced and diſtributed into their ſeveral parts, both from the earth and the air. But ſtill it is not capable of performing even this office, without the concurrent aſſiſtance of heat, which gives it the neceſſary action, exalts and digeſts the nutritive juices, dilates the pores of the plant, and raiſes the ſap into the ſtem, branches and fruit, where the ſun perfects the work, by ripening it.

The neceſſity of heat in vegetation is apparent from our fields and foreſts, our gardens and our orchards. We ſee, that in autumn, as the power of the ſun decreaſes, ſo its effects on plants diminiſh, and their vegetation ſlackens by degrees. Its failure is firſt diſcernible in trees, which, being raiſed high above the earth, require the moſt heat to elevate the water, charged with their nouriſhment, to their tops and extremities; ſo that for want of freſh ſupport and nutriment, they ſhed their leaves, unleſs ſecured by a very firm and hardy conſtitution, like that of our ever-greens. Next, the ſhrubs part with theirs; and then the herbs and lower tribes; the heat being, at length, not ſufficient to ſupply even theſe, though ſo near the earth, the fund of their nouriſhment. As the heat returns with the enſuing ſpring, they all recruit again, and are furniſhed with freſh ſupplies of verdure: Firſt, Thoſe which are loweſt and neareſt the earth, becauſe they require the leaſt degree of heat to raiſe into them the water with its nutritive charge; next, the ſhrubs and higher vegetables, in their turns; and, laſtly, the trees. As the heat increaſes, it grows too powerful, and hurries the ſap with too great rapidity through the finer and more tender plants. Theſe, therefore, go off and decay; and others, which are more hardy and vigorous, and require a greater degree of warmth, ſucceed in their order.

Mr. Tull is the only perſon who makes earth the food of plants. The experience of all ages contradicts this opinion; for the neceſſity of inducing ſomething into poor ſoils, to enable them to produce crops, is univerſally acknowledged; whereas, if earth alone was the food of plants, it would in all caſes produce the ſame effect.

As to the grand queſtion, whether plants of different kinds are nouriſhed by one univerſal food, or whether each particular ſpecies imbibes only its pecuiiar aliment; the ſupporters of this laſt opinion, among whom are the great lord Verulam and Dr. Woodward, ſay, it is not poſſible to conceive that one uniform homogeneous matter ſhould conſtitute bodies ſo unlike in all reſpects as the various tribes of vegetables; nay, even as the different parts of the ſame plant. But a moment's reflection will ſhew, that the latter part of this objection confutes the former: for if the plant has the power of altering the original juices taken in by the roots into ſo many various forms as experience proves it has, each plant may be indued with the faculty of aſſimilating to itſelf the juices it meets with in the earth; as we find the ſame food not only nouriſh different animals, but produce in each its peculiar character.

We have ocular demonſtration, that the willow and alder thrive beſt on a moiſt ſoil, and that the elm, pine, fir, and cypreſs, prefer a drier earth. Yet theſe, and many more of the wideſt difference, are ſometimes ſeen to draw their whole ſuſtenance, bulk, and ornaments, whether annual or perennial, from the juices they find in the ſame piece of ground, and from the ambient air and dews; though our ſtricteſt diligence cannot diſtinguiſh the particular aliments which approach their ſeveral roots. Changing the earth about the roots of theſe, or any other trees, whoſe bark, ſap, fruit, and ſeed, are of very different kinds and qualities, will only make each tree proſper the better. "Hence, ſays Dr. Beal, we may juſtly ſuſpect, that the very contextures of their bodies, from the firſt ſpirting of their ſeed, and as they are formed gradually from the inviſible principles or ſpirit and vigour of their ſeeds, however ſmall and imperceptible, are the natural alembics, where the common rain-water and air are digeſted into very much differing leaves, fruit, ſeed, reſins, gums, &c. perhaps as the cow's-belly converts the common juices of all ſorts of graſs into milk, or as the bee collects honey and wax from all ſorts of flowers."

The ſame ſoil that has once been proper for the production of ſome ſorts of vegetables (continue thoſe who think that each particular ſpecies of plants has its particular food) does not always continue to be ſo; but in time loſes its property. If wheat, for example, be ſown upon land proper for that grain, the firſt crop will ſucceed very well, and perhaps the ſecond, or as long as the ground is in heart; but in a few years it will produce no more, if ſown with that corn. Some other it may, as barley, rye, or buck-wheat.

That this is owing to an improper culture of the land, more than to any defect in the ſoil itſelf, will evidently appear to thoſe who ſhall candidly weigh the principles of the New Huſbandry, when that ſubject comes to be treated of.

Mr. Du Hamel makes no doubt, but that the particles which plants appropriate to themſelves, take different forms in each plant, and even in the ſeveral parts of the ſame plant; but, as he juſtly obſerves, it does not at all follow from thence, that they were not originally the ſame. What would induce one to think them the ſame, is, that plants of different kinds rob one another of the nouriſhment which is in the earth: for, if a lettuce, for example, drew from the earth a food different from that of endive, a lettuce planted among endive would not only thrive better than if planted among other lettuce, but as

well as if no other plant was near it. But we know, by experience, that this lettuce would grow very poorly, and conſequently that plants, though of different ſpecies, do hurt and rob one another. If each plant drew from the earth only the particular juices proper for itſelf, poppies, thiſtles, &c. which kill wheat, would not in that caſe do it any hurt, farther than by ſhading it with their ſtalks. But that the injury they do the corn is chiefly occaſioned by their roots, which conſume the neceſſary nutritive juices, is evident from this, that if dry branches were ſet in ſuch numbers as to make even a greater ſhade than thoſe weeds, they would not equally prejudice the growth of the wheat.

After ſome other arguments of equal force, Mr. Du Hamel concludes, that plants of different ſpecies feed on the ſame, or nearly the ſame ſubſtances; that there is no plant which does not rob thoſe that are within its reach of ſome part of their food; and that the ſoil which once is good for any one kind of plant, will always be able to ſupply it with food, provided it be properly cultivated.

To prove that the ſame juice takes different qualities in the veſſels of the ſame plant, he inſtances an experiment which he made, by grafting a young lemon, of the ſize of a pea, by the ſtalk, upon a branch of an orange-tree. It grew there, ripened, and retained its quality of lemon, without partaking in any ſhape of that of the orange. The juices of the orange-tree muſt therefore have changed their nature at once, on their paſſing into the lemon.

It is an old opinion, generally received by the ancients under the name of occult qualities, or ſympathy and antipathy, that ſome plants delight in being near each other, while others will not live together. Several of the moderns have likewiſe embraced this ſentiment, and urged in ſupport of it, the fig-tree and rue, garlick and the roſe, which, ſay they, agree remarkably well together, becauſe the juices ſuited to the one are avoided by the other. Lavender, laurel, thyme, marjoram, and other aromatic plants, cannot, on the contrary, according to them, flouriſh together, becauſe they feed on ſimilar juices, of which they rob one another. Mr. Evelyn ſeems to be nearer the truth, when, ſpeaking of this ſubject, he aſſigns as a reaſon why ſome plants will not thrive near others, certain effluvia or ſteams emitted by the one, which may be noxious to the other. Plants will not thrive under the walnut-tree, the oak, and others of the ſame kind, becauſe their numerous and wide-extended roots exhauſt the earth around them, and the drippings from their leaves are impregnated with an acrid matter, which is an enemy to vegetation.

Though there are evident inſtances of an election of food in ſome plants of very different kinds, ſuch as the aquatic race, and thoſe which delight in a dry ſituation; yet, ſo far as relates to the farmer, they may be ſaid to be nouriſhed with one and the ſame ſubſtance; but at the ſame time it is neceſſary, that both the earth and that ſubſtance be fitted for receiving and nouriſhing them: for be the earth ever ſo good, rich, and proper for the production of vegetables, little will come of it, unleſs its parts have that juſt degree of ſtrength, or coheſion, which ſhall give ſtability to the plant, and at the ſame time afford an eaſy admittance to the fibres of its roots, to ſpread and extend themſelves in ſearch of that food.

The queſtion, what is the food for plants? is of very difficult ſolution, as appears by the different opinions of thoſe who have attempted to ſolve it. One thing is obſervable, that thoſe who have endeavoured to anſwer this queſtion, ſuppoſe, that the vegetable food is ſome one kind of matter, water, air, ſalt, or earth, but they do not ſeem to mean, that plants feed upon either of theſe alone, excluſively of the other principles, for thoſe who contend for water, for example, being that food, acknowledge, that the other elements are alſo neceſſary, and concur with water to feed a plant: they acknowledge that air is neceſſary, ſo neceſſary that vegetation cannot go on without air; and the ſame may be ſaid of the reſt. Their meaning therefore appears to be, that the principle which they adopt, and ſuppoſe to be the food of plants, is ſo principally.

In the ſame manner, Mr. Tull was of opinion, that earth was that food; not however excluding the other elements, but that earth was chiefly or principally that food: for ſo he explains himſelf, page 14 of his Huſbandry, where he ſays, "and earth is ſo ſurely the food of all plants, that *with the proper ſhare of the other elements*, which each ſpecies of plants requires, I do not find but that any common earth will nouriſh any plant." Now which of theſe opinions is right, or whether any of them is ſo, is very hard to determine. Mr. Tull's definition of the vegetable food, is in p. 10. "By food is meant that matter, which being added and united to the firſt *ſtamina* of plants, or *plantulæ*, which were made in little at the creation, gives them, or rather is, their increaſe. By this definition, earth ſeems to have a better claim of being the food of plants, than either of the other elements; as earth is of a more ſolid and permanent nature, than air, water, or ſalt."

But whatever this food is, it does not appear that the reſearches of the curious concerning it, have hitherto been of much benefit to huſbandmen, or the improvement of agriculture. The diſcovery they aim at is chiefly theoretical.

But though it remains unknown what is the food of plants, there is another point of great importance diſcovered, namely whence that food is derived. It is found that the earth is enriched from the air or atmoſphere. That though it ſhould be ever ſo much impoveriſhed, and exhauſted by a repetition of robbing crops, it may be reſtored to its former fertility, and enriched to a high degree by good tillage, and expoſure to the air, by which it is again repleniſhed with thoſe fertilizing particles, whereof it was before exhauſted. This is a plain eaſy theory, that is intelligible to every common capacity, and practicable to every farmer: it is alſo immaterial to him, whether his plants are fed by air, water, ſalts or earth; it is ſufficient for him to know, that the vegetable nouriſhment, of whatever nature that is, will be obtained by good tillage and expoſure; whereof he may be ſoon convinced by his own experience; and while he keeps this principle in view, he cannot greatly err in practice.

It has been known for ages, that the moſt perfect tillage was the beſt huſbandry; the antient Romans recommend it highly, but they do not ſeem to have conſidered the reaſon that ſuch tillage enriched the earth, or was preparative to it. They alſo cultivated their vines by digging, ploughing, or hoeing: but the practice of hoeing all plants, while they are advancing in growth, and the ſurpriſing effects of it, is a late diſcovery. We find by the writings of ſeveral foreign gentlemen, how much

much they were ſurpriſed when they ſaw the effects of it upon a variety of plants ſo cultivated.

As this was ſo obvious in the culture of turnips, many farmers have extended it to other plants, as peaſe, beans, potatoes, and others, to the great improvement of their crops, and land alſo; inſomuch that they have left off fallowing, by which they formerly loſt one crop in three or four; beſides ſaving the expence of the fallow: for they now find, that by ſubſtituting hoed crops inſtead of fallowing, their lands yield good crops every year, an improvement of great importance to the farmers, and to the public.

FOOT, the part that ſupports an animal.

A horſe may have a very well made foot, and well proportioned, and yet if it chance to be thin and weak, the buyer will be diſappointed of his expectation; for ſuch a foot is liable to be ſpoiled in ſhoeing, by travelling on hard ſtony grounds, by too much drought in hot ſeaſons, or by too much moiſture in winter. A thin foot is that where the cruſt or horn is thin. This may be eaſily ſeen when the ſhoe is taken off, becauſe the verge all round the ſole will appear thin; and where it is ſo, a horſe will winch with the leaſt touch of the pincers; but as this trial will ſeldom be allowed of in buying a horſe, the beſt way to thoſe who would be acquainted with ſuch things, is to obſerve the bottom of the cruſt, which is generally ragged, and where the ſhoe-nails are clenched and rivetted: if theſe be high, it is a token the foot is thin, and that there has not been ſufficient hold for the nails, without driving them a good way upwards in the cruſt. In a thin foot, the heel and frog are alſo apt to be ſoft and tender to the touch, and by reaſon of the weakneſs natural to ſuch kind of foot, it ſometimes turns away, and one point of the heel will ſtand higher than the other, though this may be alſo owing to the crookedneſs of the paſtern joints, and will ſometimes happen where the foot is tolerably ſtrong; but is moſt common to ſuch as have weak feet; and where it is ſo, the horſe wears his ſhoes more on one ſide than the other, and often cauſes him to cut, and go lame in a journey.

As a thin weak foot is juſtly reckoned a very great defect in a horſe, ſo a very ſtrong foot is not always the moſt eligible, but is liable to ſeveral accidents. A ſtrong foot has the fibres of the hoof very diſtinct, and for the moſt part run in a ſtraight line from the coronet to the toe, like the grain of oak, lignum vitæ, or any other hard wood that eaſily ſplits; and tho' ſome ſuch feet feet will laſt very well, and keep free from accidents, where ſufficient care is taken to keep them moiſt and pliable; yet when they happen to be neglected upon a long journey, or much hard riding, eſpecially on dry ſtony grounds, or when they ſtand long in a hot dry ſtable, they will go lame and tender, at the ſame time that no defect is to be ſeen on the foot; for when the ſoft parts within are bruiſed by the hardneſs of the hoof, or by the thickneſs and hardneſs of the ſole, which in all ſuch feet is like a plate of iron; and when this happens, a horſe will be in pain, and the true cauſe ſometimes not found out for a long time, which I have known in ſeveral inſtances; nor is it eaſy to reſtore ſuch feet to a due temperament.

When a horſe that has a very ſtrong foot takes up a channel nail, or happens to be cut into the quick with a ſharp bone, a ſharp flint, or piece of glaſs, and a flow of humours follows upon ſuch a wound or puncture, the confinement theſe meet with from the ſtrength of the foot create much anguiſh, and for want of vent below, frequently cauſes an eruption round the coronet, which proves for the moſt part troubleſome, and makes the cure tedious and uncertain, eſpecially when ſuch caſes happen to fall into bad hands.

I have known ſome inſtances where the hoof and the ſole have been quite looſened from all their attachments to the foot, the filaments and fibres that unite the horny part to the fleſh being all torn and pulled aſunder by the thickneſs and ſtrength of the horn; and where this happens in any degree, it is apt to leave a tenderneſs behind it, unleſs an uncommon care be taken to prevent it.

But the greateſt inconveniency in a very hard ſtrong foot, is its being ſubject to reſts and fiſſures, which cleave the hoof quite through, ſometimes from the coronet down to the bottom; and this kind of foot is the more eaſily expoſed to ſuch accidents, that the horny fibres have a more viſible ſtraight direction than where the feet is more ſoft and pliable; theſe clefts being for the moſt part in the quarter, ſeldom admit of any other remedy than extirpating the whole piece that lies next the heel, which defect is from thence called a falſe quarter, wherein the cure is ſeldom ſo perfect, eſpecially in the fore feet, as to leave no infirmity or blemiſh behind it. When the fiſſure or cleft does not penetrate through the horn, but makes a line on the ſurface, it is called a ſand-crack, being very common in ſome ſandy countries, where the horſe's hoofs turn dry and crack with the heat of the ſand. Theſe are but little regarded where the lines are ſuperficial, and not deep in the horn, and are often cured by raſping the foot, and keeping it cool and moiſt. However, it is a defect that muſt leſſen the value of a horſe, in proportion to the degree of goodneſs or badneſs of his foot; for when the foot happens to be otherwiſe bad, theſe blemiſhes often degenerate, and are of ill conſequence.

The next defect I ſhall take notice of in the feet, is of thoſe horſes that have narrow heels. Some horſes feet are tolerably good, even where the heels are narrow; but when the foot is hot and inclined to rottenneſs, and the quarters loſe the round turn that they ought to have as they approach the heel, and look as if they were bent and pinched together, inſomuch that the heels of ſome ſuch horſes are not above two fingers in breadth, then the foot is bad; and the way that many take to mend theſe kind of feet, by hollowing on each ſide the frog, and thinning the quarters to cauſe them to ſtretch to a wider ſhoe makes them worſe; for the ſtretching out the quarters contracts the hoof on the inſtep, and almoſt always turns ſuch horſes hoof-bound, and wire-heeled.

But horſes often grow hoof-bound from other cauſes, and in ſome it proceeds from the ſhape of the coffin-bone, when it happens to be flat or hollow, where it ought to be riſing and round, when the coffin drops by thinning the ſole too much, and not taking care to ſtay it up with ſtuffing and ſplinters, and from diſeaſes in the feet that leave a weakneſs and deformity in them. But when a horſe that has a very ſtrong flinty foot happens to be hoof-bound, the caſe generally turns out bad. For the harder the hoof, the more it preſſes round the inſtep and heel. This preſſure makes the parts all round the coronet to grow fleſhy and project over the inſtep, ſo as to be conſtantly bruiſed by the upper part of the hoof, eſpecially when a horſe carries any great weight upon him, and by this means in the end engenders a quitter, which creeps ſo

under the hoof that it can ſeldom be removed without the loſs of a quarter, the ſame as when there is a fiſſure and cleft, or rather worſe, becauſe of the depreſſion and binding all round the upper part of the foot with the diſtemperature of the coronet, which often renders ſuch cures both very tedious and imperfect. Therefore this ought to be well looked into, eſpecially in chooſing a ſaddle horſe, that his feet be tolerably ſhaped, ſmooth, and cool, not narrow heeled, nor hoof-bound, neither weak-footed, nor too remarkably ſtrong; for moſt horſes of this latter kind are alſo coarſe, and chiefly fit for labour.

Another thing that ought carefully to be looked into, is that both his fore-feet be of equal ſize; for wherever this defect is the leaſt apparent, though it may proceed from a horſe's uſing one leg more than the other, as it happens to working-men who uſe the right-hand and arm more than the left; yet when one foot is ſmaller than the other, it is a blemiſh, and carries ſome doubt that ſuch a foot may in time fail and periſh, even as thoſe do that have been hurt by accidents, or after old lameneſſes in the ſhoulders, legs, and muſcular parts, where the foot at laſt periſhes in proportion as the muſcular and nervous parts ſhrink and diminiſh.

Another defect in horſes feet, is when they are flat and without depth. If ſuch a foot happens to be ſtrong, and the hoof ſmooth, if the ſole be alſo firm, and the frog no ways rotten or fleſhy, ſuch a horſe will endure the roads tolerably well. But when a flat foot is ſhaped like an oyſter, has many rings and wrinkles, if the ſole be ſoft, and the frog fleſhy and ſpongy, it is a very great defect. Some horſes are ſo remarkably faulty in this reſpect, that the frog bunches out beyond the bottom cruſt of the hoof, that their ſhoes muſt be made hollow, and the plates ſo broad as almoſt to cover the whole bottoms of their feet, to keep them from the ground. But indeed ſuch horſes are only fit for draught, and not for the ſaddle.

Some horſes have tolerable good feet, only that their heels are low. Horſes that have long yielding paſterns are the moſt ſubject to this defect, and alſo thoſe that have their paſterns very ſmall, ſhort, and ſtanding almoſt quite upright; theſe have generally long heels and flat feet, and their fore-legs coming ſtraight down from the ſhoulder to the foot, without any bending of the paſterns, and for this reaſon are frequently called goat-legged. Many of the horſes bred in the fens are of this kind, have but an aukward uſe of their limbs, and make very bad travellers, and thoſe low heeled horſes which have very long yielding paſterns, are apt to have their heels wear quite to nothing upon a journey, and all the care imaginable in ſhoeing cannot prevent it.

A very high heel is another extreme, which greatly leſſens the value of a horſe; for even where ſuch a foot happens to be ſtrong and ſmooth, it is nevertheleſs the cauſe of unſteadineſs in a horſe's going, expoſes him often to trip and ſtumble, to ſprains in the coffin and paſtern-joints, &c.

There is one kind of horſe, eſpecially among the coach and cart breed, very remarkable for a large deep foot; the horn extremely thick and ſcaly, the heels broad and mouldering, and are apt to grow ſo very faſt, that the farriers when they go about to ſhoe ſuch horſes, thinking to eaſe them of their great load, and to bring their feet into a better ſize, pare and raſp them to ſuch a degree, that they leave their feet much larger about the coronet and inſtep than at the bottom; ſo that they always look as if they went upon pattens, which is not only very ugly, but ſuch horſes are ſeldom good for much.

A very large foot of any kind is to be avoided in a horſe, even ſuppoſing it to be in itſelf firm and good. But when I ſpeak of a large foot, I mean only when it is diſproportioned to his other parts, for a large horſe muſt of courſe have a larger foot than a ſmall one. But when we ſee the foot large, and the limb ſmall, in all ſuch it muſt be obſerved by thoſe who have experience, that the bones and ſinews are alſo ſlender, which not only denotes weakneſs, but heavineſs and inaptitude to any briſk and vigorous action; and therefore unfit for the coach or ſaddle, but to draw in a cart or waggon, or to carry a burden.

Some object greatly againſt white feet, as being generally worſe than thoſe of any other colour. Indeed when a horſe has too many of his feet white, they dot not always prove the beſt, yet I have ſeen white-footed horſes have their feet ſuch as the ableſt judges could not find fault with. When a foot is ſmooth and tough, of a middle ſize, without wrinkles, neither too hard and brittle, nor too ſoft, and when the heel is firm, open, and no ways ſpongy or rotten, and the frog horny and dry, and the ſole ſomewhat hollow, like the inſide of a diſh or bowl, whatever be the colour, ſuch a foot will for the moſt part turn out good, though the dark or black hoof, where it reſembles that of deer, is generally the beſt; and for this reaſon thoſe who are the moſt curious about a horſe's feet, do not chooſe ſuch as have much white upon their legs and paſterns, to avoid their having too many white feet. *Gibſon's Farriery, vol.* I. *page* 19.

FOSSE, a ditch or moat.

FOSTAL, a way leading from the main road to a large houſe.

FOUL-FEEDING, a voracious appetite to which ſome horſes are ſubject, and though not properly a diſeaſe, is often the cauſe of various maladies. It is generally the effect of ſome latent diſtemper, as vermin, which have a quite different effect on ſome horſes to what they have on others; for as horſes of a lax habit of body often loſe their appetites by worms, and are frequently griped and ſickly in their bowels; ſo horſes of ſtrong rigid conſtitutions, that can bear the irritation thoſe animals make in their inteſtines, are often voracious in their appetites, and continually craving after food.

Foul-feeders, however, differ in ſome things from thoſe that have voracious appetites: for as the latter crave only after their common food, and can hardly ever be ſatisfied; ſo the latter will leave their hay to eat their litter, and ſeem to like it the better when it is well ſauced with their own dung and urine; and therefore, they may be properly ſaid to have a vitiated or depraved appetite. Though this does not always proceed from a voracious appetite, yet the firſt is often productive of the latter, and may probably be occaſioned by enlarging the capacity of the ſtomach and inteſtines to ſuch a degree, that nothing will ſatisfy their cravings, but what has weight and ſolidity; for the ſame kind of horſes will eat mould and wet clay, or any kind of foul naſty weeds out of the ditches, and in the ſtable will eat ſtinking muſty hay, which the generality of horſes will refuſe.

There are others of depraved appetites, that are neither foul nor voracious feeders, ſuch as we often obſerve eat dry loam or mud out of the walls, which perhaps denotes ſome

ſome vitiated juices in their ſtomach; and this alſo is frequently owing to vermin, or at leaſt to a bad digeſtion, though perhaps not to any imbecility in their conſtitutions; for though thoſe horſes have a longing for thoſe extraneous things, yet their appetites at the ſame time ſeldom fail: but as this is often owing to full feeding, with the want of ſufficient exerciſe, ſo we often ſee them recover and quite loſe that vitiated taſte, when they come to ride a journey, or go upon any other conſtant exerciſe.

The beſt method in all theſe caſes of a vitiated or depraved appetite, is to begin with purging, and to diſſolve chalk in their water, and afterwards to give them good exerciſe. The ſame method may be complied with to thoſe that feed voraciouſly. To theſe the following draught may alſo be given, to blunt their appetites:

Take a large handfull of the roots of marſhmallows, cummin-ſeeds, and fenugreek-ſeeds, of each an ounce: liquorice roots ſliced, half an ounce; boil in three pints of water till the roots are ſoft and ſlimy, then pour off the decoction, and diſſolve in it an ounce of gum-arabic, and add four ounces of linſeed-oil.

Let the horſe have four handfuls of this every morning faſting, till his appetite abates. If the horſe be lean, which many voracious feeders are, he will gather more fleſh under this management, and as his fleſh increaſes his appetite will abate.

As to foul feeders, many of theſe begin with voraciouſneſs, and when they come to be ſtinted, take to eating of their litter to fill their ſtomachs, and in time take a great liking to it; and it is obſervable, that many of the horſes that go broken winded, have this evil faculty; and therefore I ſhould adviſe any one who has a foul-feeding horſe, to keep his ſtall as clean as poſſible, to let no wet, dirty litter, lie under him, nor to put his litter under the manger, but to beſtow it on ſome other horſe, otherwiſe they will paw it out, and feed upon it greedily; but clean ſtraw that has not been ſoaked with horſe-piſs and filth, will never hurt any horſe: for though there is no harm in the urine, yet when the ſtraw has been ſoaked in it with the dung, it often turns into a wad, or like a ſponge in their bowels, and cauſes great diſorders. But when their wet litter is taken away every morning, it may be the means to make them leave off that ill habit. *Gibſon's Farriery, vol.* II. *page* 96.

FOWL, a general name for all ſorts of birds; but uſed in a particular ſenſe to ſignify ſuch as are bred in the farmer's yard for profit.

The countryman's farm or habitation cannot be ſaid to be compleatly ſtored or ſtocked without fowl as well as beaſt, which yield a conſiderable advantage by their eggs, brood, bodies, and feathers. Any poor cottager that lives by the high way-ſide may keep them, they being able to ſhift for themſelves the greateſt part of the year, by their feeding on inſects, corn, or any thing almoſt that is eatable by any other ſort of animal: and therefore they are kept to great advantage at barn-doors, and other places, where corn or ſtraw is ſcattered.

As for cocks and hens, we ſhall not enter into a deſcription of the ſeveral ſorts of them, only obſerve that thoſe that are the beſt breeders, and the beſt layers, are to be choſen, the oldeſt being always the beſt ſitters, and the youngeſt the beſt layers; but no ſort will be good for either if they are kept too fat. The beſt age to ſet a hen for chickens, is from two years old to five; and the beſt month to ſet them in, is February, though any month between that and Michaelmas is good. A hen ſits twenty days; whereas geeſe, ducks, and turkeys, ſit thirty. Obſerve to let them have conſtantly meat and drink near them while they ſit, that they may not ſtraggle from their eggs, and chill them. One cock will ſerve ten hens.

If fowls are fed with buck or French wheat, or with hemp, canary, or millet-ſeed, which is commonly ſown in March, it is ſaid they will lay more eggs than ordinary; and buck-wheat, either whole or ground, and made into paſte, which is the beſt way, is a grain that will fat fowls or hogs very ſpeedily; but the common food to fat them with is barley-meal wet with milk or water; but wheat-flour is better: but if you deſign to bring up chickens, give a barley-corn or two to each of them, as you take them out of the neſt, and ſo continue to feed them till they are fit for fatting.

For the beſt methods of breeding ducks, geeſe, turkeys, pigeons, ſwans, peacocks, &c. *ſee each under its proper article* DUCKS, GEESE, TURKEYS, &c.

FOWL's *Dung. See the article Dung.*

FOX, a well known animal of the canine kind, with ſharp ears and a buſhy tail.

The fox is very prejudicial to the huſbandman, by taking away, and deſtroying of his lambs, poultry, geeſe, &c. eſpecially in places that are near foreſt-woods, and covert places. The beſt way of deſtroying them is with guns or traps, after this manner: if you deſign to ſhoot them, procure a ſheep's paunch, and tying of it to a long ſtick rub your ſhoes well upon it, that the fox may have no ſcent of your feet, and draw the paunch after you, with which make a trail a mile or two in length; and order it ſo as to bring it near ſome thick-headed tree. At which place, when you have made your trail, leave your paunch, and with your gun get up into the tree; and as ſoon as it begins to be dark, you will ſee him come by you upon the ſcent of the trail, where you may ſhoot him. Obſerve that you draw the trail to windward of the tree, if you can.

But if you have a mind to catch them with a ſteel-trap, which is the ſureſt way, chooſe a place to ſet it in a plain part of a large field; let it be out of the way of all paths, but not near either a hedge or any ſhelter. Open your trap, and lay it upon the ground, and cut out in the turf juſt the form thereof, and take out ſo much earth as may make room to lay it, covering of it again very neatly with the turf you cut out; and becauſe the joints of the turf will not cloſe exactly, get ſome of the fine mould that is to be found in a new caſt up mole-hill, and fill the joints with it, taking ſome graſs, and ſticking of it in the mould, as if it grew there. Make all ſo fine and plain, as that it may deceive your own eye to look upon it. About eight or ten yards from the trap, three ſeveral ways, ſcatter ſome of the fine mould that you had out of the mole-hill, very thin upon a place about fourteen or fifteen inches ſquare; and upon theſe places, and where the trap is, lay two or three ſmall bits of cheeſe, and with a ſheep's paunch, as is before directed, draw a trail of about a mile long to each of the three places, that are at a diſtance from the trap, and from thence to the trap, that ſo the fox may come upon one of thoſe places firſt, which will make him approach the trap with more boldneſs, where you will ſeldom

ſeldom fail of him; only you muſt obſerve not to faſten your trap, but to leave it looſe, that he may draw it to the hedge-ſide, or to ſome cover, or elſe he will bite off his leg, and be gone.

Some bend down a ſtick in the wood, and ſet a trap for them in their paths, like that which is ſet for woodcocks, which hangs them up, or any other ſort of vermin. *Mortimer's Huſbandry, vol.* I. *page* 312.

FOX-TAIL GRASS, the ſame with cow-wheat. *See the article* COW-WHEAT.

FRAGRANT, odorous, ſweet of ſmell.

FREE-MARTIN, a barren heifer.

FRENCH BARLEY, a ſpecies of barley called by botaniſts *tritico ſpeltum*. Some call it wheat-barley. It is naked and the grain like wheat, but the ear ſhaped like that of the common barley. This ſpecies is often ſown about Rowley, Hamſtal, and Redmore, in Staffordſhire. It yields a large increaſe, and makes good bread and good malt. *See the article* BARLEY.

FRENCH BEANS. *See the article* BEANS.

FRITH, an arm of the ſea running into the land.

FROST, the laſt effect of cold; the power or act of congelation.

Froſt is a great fertilizer of land, and therefore when the ſoil is a harſh, churliſh or obſtinate clay, it ſhould be turned up in ridges at the beginning of winter, which will greatly tend to remove its bad qualities, and ſeparate its particles.

Hard winters are generally of ſervice to corn in many reſpects; eſpecially if the land has been thoroughly drained, and is well covered with ſnow. This laſt mellows the ground and keeps it warm; while froſt, neither the rigour nor duration of which need be feared if it comes on gradually, and the land is dry, not only kills great numbers of vermin and inſects, but, by leaving the earth in a looſe ſtate, fits it for roots to extend themſelves therein as the warmth of the ſpring approaches, and thereby enables them to produce ſtrong plants; whereas frequent rains in winter, without froſt, ſodden the earth, which afterwards produces nothing but blades, ſoon to be deſtroyed by the hoar froſts of the ſpring, by inſects, and by weeds; or which would yield at moſt only ſtraw without grain. The winter's froſts may indeed nip off the blades; but then the roots being unhurt, new ones will ſhoot up in the ſpring. This was the caſe in the remarkably ſevere winter of 1608, of which Mezeray ſpeaks, and which, notwithſtanding its extreme ſeverity, was followed by a plentiful harveſt; and ſuch alſo, or nearly ſuch, was the long winter of 1739.

The great danger from froſts is, when the earth is wet, and not covered with ſnow. For example, if a ſtrong froſt returns after a ſudden thaw, the fibres of the roots are broken by the expanſion of the ſurrounding water when frozen, and the too great abundance of moiſture in the plants themſelves when frozen, tears their fibres to pieces by the ſame expanſion. This was what happened in 1684.

Early in the ſpring of 1710, the parliament of Paris, hoping that the corn cut off by the preceding winter would ſhoot out again, as it did after the winter of 1608, mentioned by Mezeray, forbid ſowing anew the lands which had been ſown the autumn before: but the expectation now proved groundleſs, the plants having been totally deſtroyed by repeated froſts, intermixed with frequent thaws; ſo that had it not been for the barley that was ſowed afterwards, which yielded ſuch prodigious crops, that the French ſtill call that year the year of barley, the dearth muſt have been much more dreadful than it was. In that very ſpring, after the hard winter, ſeveral people in the dutchy of Berry, and elſewhere, ſowed wheat, which ſprouted well, and grew, but did not ſpindle; whereupon ſome mowed their crops, and others turned in cattle to feed as in a meadow: but after another winter had paſſed over them, theſe very fields yielded the next year as plentifully, as if they had been ſown anew. In incloſed grounds, the corn near hedges, which ſecured it from the north wind, reſiſted all the rigour of that exceceſſive cold; and in other places, where the poor peaſants raked up all the ſnow they could collect, and ſpread it with their hands upon the uncovered ſpots of their ſmall fields, their corn was preſerved, and yielded a good crop.

A gentleman, now living in England, had a field of wheat ſo greatly damaged by alternate froſt and thaw, that the neighbouring farmers thought he could not do better than plough it up for ſpring corn; but obſerving that many of the plants were yet alive, and in a condition to be recovered, though thinly ſcattered, he hand-hoed the whole, and reaped three quarters of corn from each acre of this land.

Wheat is very hardy, and rarely injured by froſt, if the land upon which it grows is not wet. In the great froſt of the year 1739-40, the froſt was often intenſe in the nights, and in the days a bright ſun-ſhine; theſe alternate changes reduced the ſurface of the land to duſt, which was ſo light, that the wind blowed the mould off the ſouth ſides of the ridges that lay eaſt and weſt; but on the north ſides, that were not ſo much expoſed to the ſun, the mould not being ſo much pulverized, was not blown off, and the wheat there was very little hurt; while the roots of the wheat on the ſouth ſides was laid bare, and the plants in general were killed by the froſt. The blades of all the wheat were deſtroyed, and nothing green to be ſeen, and many farmers ploughed up their wheat, thinking it was all dead: others, more curious, finding upon examination, that the roots were ſtill alive, ſuffered their wheat to remain, which, upon the froſt going off, recovered, ſhot up new ſtalks, which branched greatly, and produced very large ears, and very full grained corn, ſo that upon the whole there was a plentiful crop. From this and other inſtances it appears, that wheat upon dry healthy land is not killed by froſt, unleſs its roots are all, or moſt of them, expoſed to it.

FROWAR, the name of an edge tool, uſed in cleaving laths.

FRUNDELE, two pecks, or half a buſhel.

FRUSHES. *See* RUNNING-THRUSH.

FUDDER, a load. It properly relates to lead, and ſignifies a certain weight, viz. eight pigs, or ſixteen hundred weight.

FULLERS EARTH, a native earth found in many parts of England, and much uſed by fullers in cleaning and ſcouring their cloth. It is of a very fat nature, and very full of that vegetative ſalt that helps the growth of plants; and therefore may be uſed with advantage, where it is found in plenty, on ſome ſorts of land.

FURLONG, the eighth part of a mile.

FURROW, a trench made by the plough.

FURZE, *whins* or *gorſe*, to which C. Bauhin and Mr. Ray, give the name of *geniſta ſpinoſa*, and which Linnæus and Miller call *ulex*, propagate themſelves ſo rapidly, by

by ſowing their ſeeds, that, where they are once eſtabliſhed in a ſpot of ground, they ſoon over-ſpread the whole place; for, as the ſeeds ripen, their pods are opened by the warmth of the ſun, and they are thrown out with an elaſtic jirk to a conſiderable diſtance all around. There they vegetate, and the ground is ſoon filled with young plants, which are not eaſily deſtroyed after they have taken good root. The only way of extirpating them, is by paring off and burning the ſurface of the ground. *See the article* BURN-BAKING.

This is by ſo much the more adviſable, as theſe ſeeds will otherwiſe remain a long while found in the earth, and grow whenever they are brought up by ploughing; and alſo becauſe the ſmalleſt fragments of this plant will ſtrike out freſh roots, and ſhoot up anew, but when a good thickneſs of the ſurface is pared off, and burnt, the ſeeds are ſo effectually deſtroyed, and the roots are killed to ſo conſiderable a depth, that neither can again give riſe to new plants; and if a few of theſe do appear, a ſummer fallow will put an entire end to their growth. Their increaſe may likewiſe be prevented by good manuring with marl, chalk, or lime, eſpecially in ſandy ſoils, which are moſt apt to produce this plant, and which are at the ſame time the moſt benefited by theſe helps.

However this very plant, formerly deemed a great nuiſance, is now cultivated to advantage on light, ſandy dry ſoils, which would otherwiſe turn to little account. The tops of the common Engliſh furze, bruiſed a little to take off, or to blunt their prickly tips, have been found to be excellent fodder, even for lean ſickly beaſts, and particularly horſes, which they have frequently recovered, and plumped up in a ſhort time. This cuſtom is much practiſed in ſeveral foreign countries, where furze are cultivated purpoſely for fodder; and the peaſant thinks it a happineſs that his breaking their ſpikes with a mallet enables him to give this wholeſome green food to his cattle in the winter, when often no other ſucculent plant can be had fit for that uſe. The mills which Sir Capel Hanbury has lately erected for this end in Wales, with a patriotic ſpirit, well ſuited to his diſtinguiſhed zeal for the public welfare, will ſave the countryman that laborious taſk, and prove highly beneficial to thoſe who follow his judicious example.

When furze are raiſed on purpoſe for the food of cattle, and eſpecially on ſoils like the above mentioned, their ſeeds ſhould be ſown in February, March, or April, and the ground ſhould be prepared as for barley. Six pounds of them will be ſufficient for an acre of land; and they ſhould be but barely covered over. The young plants muſt be preſerved from cattle during the firſt year, and they will be fit to mow or cut in the next. October is the proper time to begin cutting them. They will continue to ſhoot till Chriſtmas, and be fit for uſe till March. Horſes eat them as readily as they do hay, after they have been bruiſed, or pounded, ſo as to take off their ſharp points; and it is ſaid, that an acre of ground will produce fifteen tons of this fodder, and that it will go as far as an equal quantity of hay. Some mix the bruiſed furze with chopped ſtraw; an hundred of ſtraw to a ton of furze; but only the growth of the year ſhould be cut for cattle.

Poor hungry gravelly ſoils, which would not have let for five ſhillings an acre, have been rendered worth twenty ſhillings an acre, by ſowing of them with furze ſeed, in places where fuel has been ſcarce; this being frequently uſed for heating ovens, burning lime and bricks, and alſo for drying malt; but it is not worth cultivating in countries where fuel of any kind is cheap, or upon ſuch lands as will produce good graſs or corn.

Some years ago, the common furze uſed to be much ſown for hedges about fields; and where the ſoil was light, the plants ſoon became ſtrong enough for a fence againſt cattle: but as theſe hedges grow naked at the bottom in a ſhort time, and the plants frequently failed, ſo as to leave conſiderable gaps, this practice has of late been greatly diſuſed. The ſpecies commonly called French furze is the beſt for this purpoſe, becauſe it thickens more near the ground, and grows to a greater height; but its ſhoots are not tender enough for cattle to eat them. This is alſo conſidered as the moſt difficult to extirpate: though Mr. Bradley, who tells us he had ſeen fields of one hundred and fifty acres planted with it in Devonſhire, ſays, that it may be killed by cutting the woody ſtalks within a foot of the root in ſummer time; for that it will not then ſpring up again like the ſmall wild furze or whins, by which name Mr. Markham diſtinguiſhes the ſmaller from the larger ſort. This begins to blow in the middle of January, and continues in bloſſom all the ſummer; while the Engliſh furze does not bloom till towards the end of the ſpring, and finiſhes its bloſſoming at the ſame time as the other.

The marquis of Tourbilly obſerves, that cows, oxen, and moſt other cattle, as well as horſes, feed heartily upon, and are well fed by, the bruiſed tops of furze; and that we may be ſure corn will do well wherever this plant is met with: for be the ſurface of the ground what it will, the ſpontaneous growth of the furze always indicates a depth of good mould underneath; and the continual dropping and rotting of the leaves, will infallibly improve and enrich the ſurface. The flowers of the furze are excellent for bees.

FUZZEN, *or* FUZEN, the natural juice or nouriſhment of any thing; the ſtrength of it.

G.

G A L

GALLERY, a kind of covered walk in a garden, formed into porticoes or arches, with horn-beams, lime-trees, or the like.

GALLING *of a horſe's back*, a diſorder occaſioned by heat, and the chafing or pinching of the ſaddle.

In order to prevent it, ſome take a hind's ſkin well garniſhed with hair, and fit it neatly under the pannel of the ſaddle, ſo that the hairy ſide be next the horſe.

When a horſe's back is galled upon a journey, take out a little of the ſtuffing of the pannel over the ſwelling, and ſew a piece of ſoft white leather on the inſide of the pannel; anoint the part with ſalt butter, and every evening wipe it clean, rubbing it till it grow ſoft, anointing it again with butter, or, for want of that, with greaſe: waſh the ſwelling, or hurt, every evening with cold water and ſope, and ſtrew it with ſalt, which ſhould be left on till the horſe be ſaddled in the morning.

GALLON, a meaſure of capacity both for dry and liquid things, containing four quarts; but theſe quarts, and conſequently the gallon itſelf, are different, according to the quality of the thing meaſured: for inſtance, the wine gallon contains 231 cubic inches, and holds eight pounds avoirdupoiſe of pure water: the beer and ale gallon contains 282 ſolid inches, and holds ten pounds three ounces and a quarter avoirdupoiſe, of water; and the gallon for corn, meal, &c. 272 cubic inches, and holds nine pounds thirteen ounces of pure water.

GALLOWS *of a plough*, a part of the plough-head ſo called by farmers, from its reſemblance to the common gallows, as conſiſting of three pieces of timber, of which one is placed tranſverſely over the heads of the other two. *See* PLOUGH.

GAP, a breach or opening made in a hedge.

GARGET, or *Gargol*, a diſtemper incident to hogs; and is known by the creature's hanging down his head, and carrying it on one ſide, moiſt eyes, ſtaggering, and loſs of appetite.

It is occaſioned by a corruption of the blood, engendered by the eating of rotten fruits, garbidge, carrion, or rank graſs, wherein is much hemlock, &c.

In order to cure this diſeaſe, let the creatures be firſt blooded both under the tail and under the ears, and then the following drink given them:

> Take of chamber-lye one pint: rue and ſouthernwood, cut ſmall, of each a handful; wood-ſoot from an oven, and common ſalt, of each a ſpoonful; hen's dung, near two ſpoonfuls; flowers of brimſtone one ounce: ſtir the whole together, and give two or three horns to each, proportional to their ſize. It is alſo good for a cow to cure the gargal or murrain.

Or you may uſe the following drink in the room of the above:

> Take angelica, ſtavewort, or hog's madder, and May-weed, of each one handful; ſhred them together very ſmall, and boil them very well in a pint of milk; and when it is cold enough, add to it a penny-worth of ſallad-oil, and the ſame quantity of treacle. *Mortimer's Huſbandry, vol.* I. *pag.* 250.

G A R

GARTH, a yard, a backſide, a croft.

GARNER, a granary, or repoſitory for corn.

GARZIL, hedging wood.

GATE, a frame of timber upon hinges to give a paſſage into incloſed grounds.

GATEWAY, the paſſage through gates of incloſed grounds.

GATTERIDGE-TREE, prickwood.

GAVEL, a row, or ſwarth of corn cut down with the ſcythe.

GAVEL, is alſo a provincial word, ſignifying ground.

GAVEL-KIND, a cuſtom whereby the lands of the father are equally divided at his death among all his ſons.

GAVELOCK, a pitch, or iron-bar for entering ſtakes into the ground.

GEESE, birds too well known to need any deſcription here. They are very profitable to the farmer many ways, for their fleſh, their feathers, and their greaſe. They will live upon commons or any ſort of paſtures, and need very little care or attendance; only they ſhould have plenty of water. The largeſt geeſe are reckoned the beſt: but there is a ſort of Spaniſh gooſe, that is a much better layer and breeder than the Engliſh, eſpecially if the eggs are hatched under an Engliſh gooſe.

Geeſe lay in the ſpring, the earlier the better; becauſe of their price, and their having a ſecond brood. They commonly lay twelve or ſixteen eggs apiece. You may know when they will lay, by their carrying ſtraw in their mouth; and when they will ſit, by their continuing on their neſts after they have laid. A gooſe ſits thirty days; but if the weather be fair and warm, they will hatch three or four days ſooner. After the goſlins are hatched, ſome keep them in the houſe ten or twelve days; and feed them with curds, barley-meal, bran, &c. and

Fig. 3. **Hoe-Plough.**

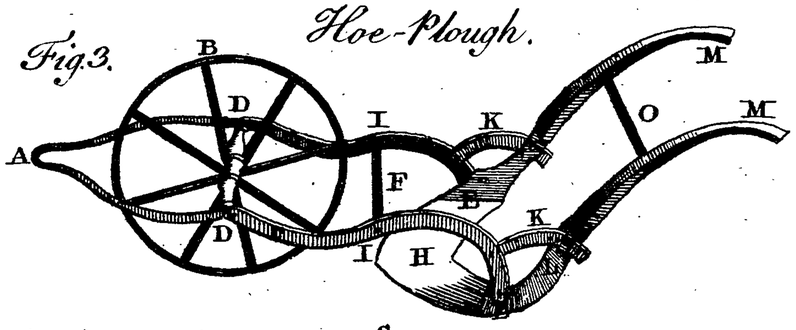
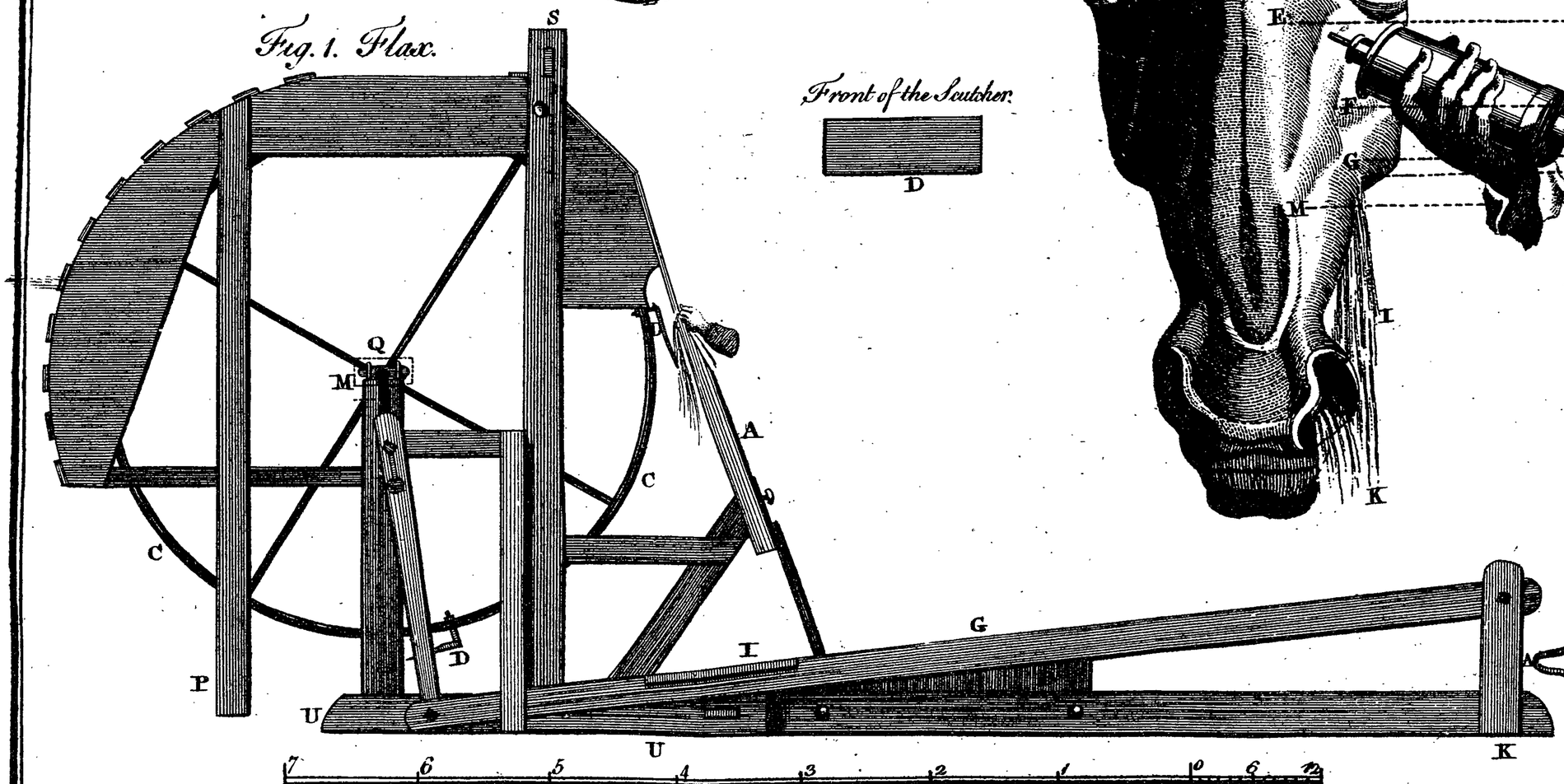


Fig. 1. Flax.



Front of the Scutcher.

Fig. 2. Glanders.

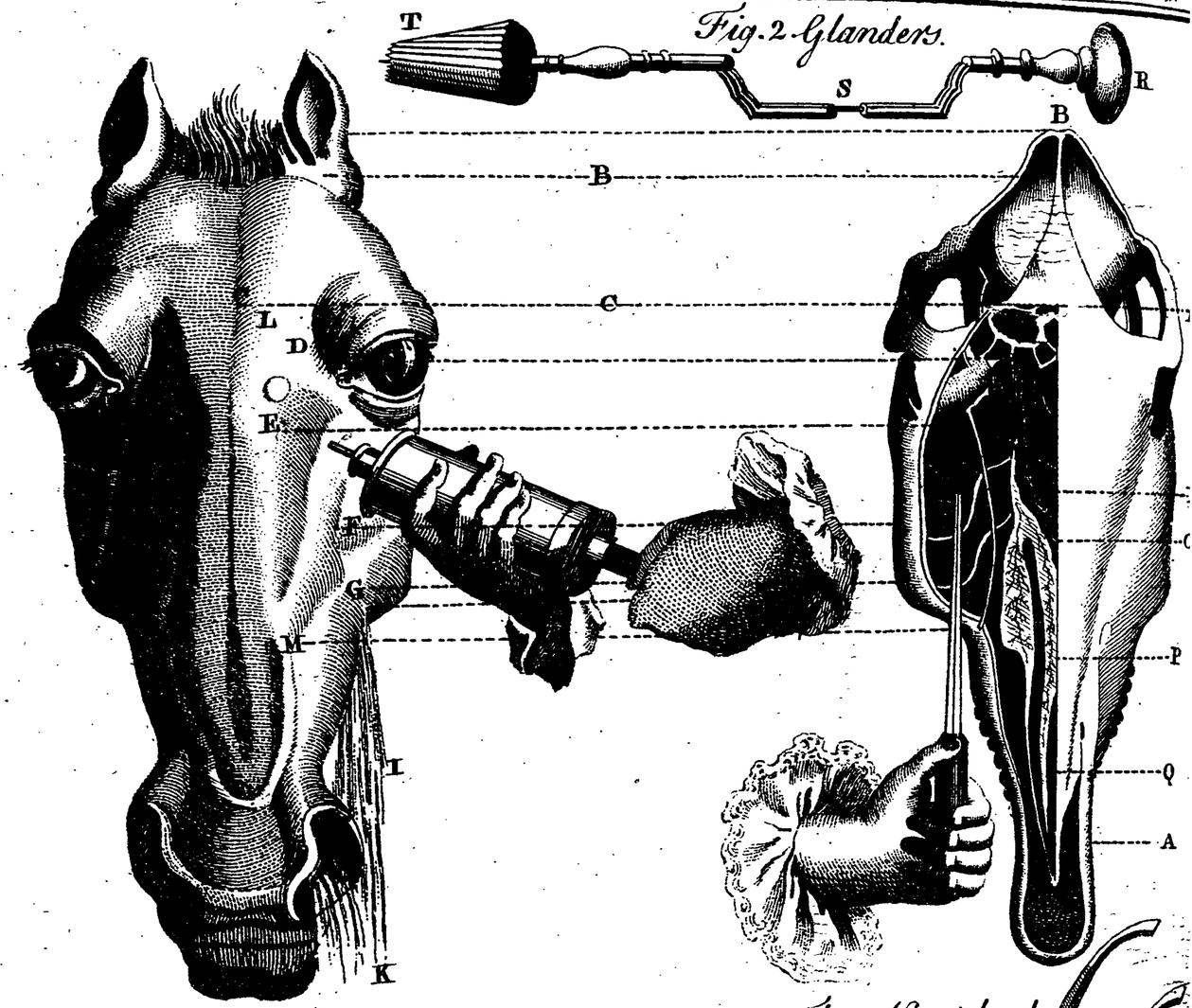
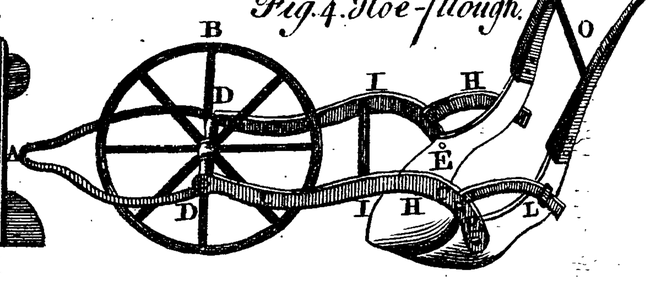


Fig. 4. Hoe-plough.



and after they have acquired ſome ſtrength, let them out four or five hours a day, taking them in again till they are big enough to defend themſelves from vermin. Others put them out at firſt, and perhaps ſucceed as well as the former. One gander will be ſufficient for five geeſe.

If you would fat green geeſe, you muſt ſhut them up when they are about a month old, and they will be fat in about a month more. Be ſure to let them have always by them, in a ſmall rack, ſome fine hay, which will much haſten their fatting. But for fatting of older geeſe, it is commonly done when they are about ſix months old, in or ſoon after harveſt, when they have been in ſtubble fields, from which food ſome kill them, which is a good way. But thoſe who are deſirous of having them very fat, ſhut them up, for a fortnight or three weeks, and feed them with oats, ſplit beans, barley-meal, or ground-malt mixed with milk; but the beſt thing to fatten them with is malt mixed with beer. You muſt however obſerve in fattening all ſorts of water-fowl, that they uſually ſit with their bills upon their rumps, where they ſuck out the greater part of their moiſture and fatneſs, at a ſmall bunch of feathers, which you will find ſtanding upright on their rumps, and always moiſt, with which they trim their feathers, which renders them more oily and ſlippery than the feathers of other fowls, and cauſes the water to ſlip off them. If therefore theſe upright feathers are cut away cloſe, they will become fat in leſs time, and with leſs meat than otherwiſe. Geeſe will likewiſe feed on, and fatten well with carrots cut ſmall and given them; or if you give them rye before, or about Midſummer, it will ſtrengthen them, and keep them in health, that being commonly their ſickly time.

In ſome countries they ſhear their geeſe for feathers, and ſome pull them twice a year; but the latter is more injurious to them, and therefore it is better ſtaying till their moulting time, and till their death, for the feathers. *Mortimer's Huſbandry, vol.* I. *page* 255.

GELDING, a caſtrated animal. For the method of gelding horſes, *See the article* HORSE.

GELT-GIMMER, a barren ewe.

GEOFF, or *Goffe*, a mow of hay or corn.

GERMINATION, the act of ſprouting or ſhooting: growth.

GERMINS, buds, tender ſhoots.

GIGGS, ſmall ſwellings, or bladders on the inſide of the lips and palate of a horſe.

They are cured by ſlitting them open with a knife or lancet, and waſhing them afterwards with ſalt and vinegar.

GILL, a rivulet, a beck. It is alſo a name for ground-ivy, or ale-hoof.

GIMMER-LAMB, or *Gammer-Lamb*, an ewe-lamb.

GLANDERS, a very obſtinate and loathſome diſeaſe incident to horſes.

The cauſe and ſeat of the glanders has till lately been ſo imperfectly handled, and ſo little underſtood by the writers on this diſtemper, that it is no wonder it ſhould be ranked among the incurables; but a new light having been thrown on this whole affair by the ſtudy of M. La Foſſe, the king of France's farrier, who has been at the pains to trace out, and diſcover, by diſſections, the ſource, and cauſe of this diſorder, we hope the method he has propoſed, with ſome further experiments and improvements, will ſoon bring to a certainty of cure (in moſt caſes at leaſt) a diſtemper ſo dangerous to our horſes, and that hitherto has eluded the force of art.

Before we make mention of this work, which has the approbation of the Royal Academy of Sciences, it will not be unacceptable to our readers, we apprehend, to have a more particular account of the ſymptoms of this diſorder from M. La Foſſe, that we may the better judge of the merit of our author and his diſcoveries.

This gentleman then has diſtinguiſhed ſeven different kinds of glanders, four of which are incurable.

The firſt proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is diſcharged through the noſtrils, like a whitiſh liquor, ſometimes appearing in lumps and grumes. In this diſorder, though the matter is diſcharged from the noſtrils, yet the malady is ſolely in the lungs.

The ſecond is a waſting humour, which uſually ſeizes horſes at the decline of a diſeaſe, cauſed by too hard labour; this defluxion alſo proceeds from the lungs.

The third is a malignant diſcharge, which attends the ſtrangles ſometimes, and falls upon the lungs, which runs off by the noſtrils.

The fourth is, when an acrimonious humour in the farcy ſeizes theſe parts, where it ſoon makes terrible havock.

The fifth kind we ſhall deſcribe by and by, as ariſing from taking cold.

The ſixth kind is a diſcharge from the ſtrangles, which ſometimes vents itſelf at the noſtril,.

Theſe are the various diſorders which have been obſerved ſometimes to throw matter out from the noſtrils; let us now deſcribe the real glanders:

The matter then diſcharged from the noſtrils of a glandered horſe, is either white, yellow, or greeniſh, ſometimes ſtreaked, or tinged with blood; when the diſeaſe is of long ſtanding, and the bones are fouled, the matter turns blackiſh, and becomes very fœtid; and is always attended with a ſwelling of the kernels or glands under the jaws: in every other reſpect the horſe is generally healthy and ſound, till the diſtemper has been of ſome continuance.

It is always a bad ſign, when the matter ſticks to the inſide of the noſtrils, like glue or ſtiff paſte; when the inſide of the noſe is raw and looks of a livid, or lead colour, when the matter becomes bloody, and ſtinks, and when it looks of an aſh-colour. But when only a limpid fluid is firſt diſcharged, and afterwards a whitiſh matter, the gland under the jaw not increaſing, and the diſorder of no long continuance, we may expect a ſpeedy cure; for in this caſe, which ariſes from taking cold, after a horſe has been over-heated, the pituitary membrane is but ſlightly inflamed, the lymph in the ſmall veſſels condenſed, and the gland overloaded, but not yet ulcerated.

From theſe ſymptoms and ſome obſervations made both by Bracken and Gibſon, it is plain they were not abſolute ſtrangers to the ſeat of this diſorder, though they neglected puſhing their inquiries to the fountain-head, and conſequently were at a loſs to know how to apply the remedy to the parts affected.

But our author, after examining by diſſection the carcaſſes of glandered horſes, and making a ſtrict ſcrutiny

into the ſtate of the viſcera, aſſiſted for that purpoſe by ingenious and expert anatomiſts for ten years together, affirms this diſeaſe to be altogether local; and that the true ſeat of it is in the pituary membrane, which lines the partition along the inſide of the noſe, the maxillary ſinuſſes or cavities of the cheek-bones on each ſide the noſe, and the frontal ſinuſſes or cavities above the orbits of the eyes; that the viſcera, as liver, lungs, &c. of glandered horſes are in general exceeding ſound; and conſequently that the ſeat of this diſorder is not in thoſe parts, as has been aſſerted by moſt authors; nor indeed is it probable it ſhould: for how could ſuch horſes preſerve their appetite, their good appearance, ſleek and ſhining coats; in a word, all the ſigns of health for many years together (which many glandered horſes are known to enjoy) with ſuch diſtempered bowels.

But on nicely examining the heads of ſuch horſes, he found the cavities above-mentioned, more or leſs, filled with a viſcous ſlimy matter, the membrane which lines both them and the noſtrils inflamed, thickened, and corroded with ſordid ulcers, which in ſome caſes had eat into the bones. Theſe ſinuſſes or cavities will be better underſtood by referring to the annexed plate.

He obſerves, that when glandered horſes diſcharge matter from both noſtrils, both ſides of the membrane and cavities were affected; but when they ran at one noſtril only, that ſide only was found diſtempered.

It is a curious remark of our author, that the ſublingual glands, or the kernels ſituated under the jaw-bone, which are always ſwelled in this diſtemper, do not diſcharge their lymph into the mouth, as in man, but into the noſtrils; and that he conſtantly found their obſtruction agreed with the diſcharge; if one gland only was affected, then the horſe diſcharged from one noſtril only; but if both were, then the diſcharge was from both.

He ſometimes, though rarely, found the boney partition of the noſe carious or rotten; but that the ſpongy bones about this part muſt ſuffer from the acrimony of matter long pent, is not at all to be doubted, though the more ſolid ones may eſcape.

The ſeat of this diſorder thus diſcovered, our author, with great ingenuity, has paved the way for cure, by trepanning theſe cavities, and taking out a piece of bone, by which means the parts affected may be waſhed with a proper interjection; and, in fine, the ulcers deterged, healed, and dried up.

But as from the obſervations ſince made by this gentleman, there are different ſpecies of the glanders, ſo the cure of the milder kinds may firſt be attempted by injections and fumigations. Thus, after taking cold, ſhould a horſe for fifteen or twenty days diſcharge a limpid fluid, or whitiſh matter from one or both noſtrils, the glands under the jaw rather growing harder than diminiſhing, we may expect it will degenerate into true glanders: to prevent which, after firſt bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of linſeed, marſhmallows, elder, chamomile flowers, and honey of roſes, or ſuch like, be thrown up as far as poſſible with a ſtrong ſyringe, and repeated three times a ſtay: ſhould the running not leſſen, or be removed in a fortnight by the uſe of this injection, a reſtringent one may now be prepared with tincture of roſes, lime-water, &c. and the noſtrils fumigated with the powders of frankincenſe, maſtich, amber, and cinnabar, burnt on an iron heated for that purpoſe, the fume of which may eaſily be conveyed through a tube into the noſtrils.

This method has been found ſucceſsful when uſed in time; but the methods of cure depend on the ſtubbornneſs of the diſorder; and, when inveterate, recourſe muſt be had to the operation above deſcribed.

This operation he has performed on three horſes, two of whom diſcharged from one noſtril only, and the third from both; the two firſt he trepanned on that ſide of the head which was affected, and to the other he performed it on both, and found that the wound and perforation filled up with good fleſh in twenty-ſix days, and the horſes ſuffered no inconvenience from the operation; though after this experiment they were put to death.

The directions and orders of the civil government of France, which hinder people from keeping glandered horſes, long prevented M. La Foſſe repeating his attempts, and puſhing his experiments further; but it is to be hoped that ſo uſeful a project will be purſued to its utmoſt extent, as it ſeems ſo promiſing in the execution, and is ſo important in its conſequences: to which end we ſhall beg leave to animadvert on what has been ſaid, and offer our opinion both in relation to the diſeaſe, the operation, and the manner in conducting the cure.

In order to prove that a great inflammation of the pituitary membrane is always the cauſe of the glanders. M. La Foſſe has attempted to bring on an inflammation upon the ſame membrane, by a corroſive injection; and when the injection was only thrown into one ſide, the maxillary lymphatic glands were ſwelled on the ſame ſide, and that noſtril only produced the diſcharge; but when both noſtrils were injected, theſe ſymptoms appeared on both ſides. This gentleman has alſo obſerved, that the bone of the maxillary ſinus being broke by the kick of another horſe, the uſual ſymptoms of the glanders ſoon appeared, from the inflammation the pituitary membrane ſuffered on the occaſion.

The original ſource and cauſe then of this diſorder ſeems to be an inflammation in the glands, and membrane that lines the noſtrils and theſe cavities, which, if not diſperſed in time, will form matter, and ulcerate and erode the bones, for want of a free diſcharge to unload the cavities, and of proper applications to cleanſe and deterge the ulcers: violent cold, or a feveriſh tranſlation ſettling here, may alſo occaſion the ſame complaint, and are probably the general cauſes.

There is a diſorder in men called *Ozæna*, that has great ſimilitude to this in horſes, and ariſes from an inflammation in the maxillary ſinuſſes, or cavities in the cheek-bones, from whence enſues a collection of matter, which, when the cavity is full, or the head properly inclined, runs over into the noſe, and would conſtantly diſcharge thence like a glandered horſe, was the head continued in the ſame poſition. The ſurgical cure is the taking out one or more teeth from the upper jaw, and perforating the cavity with a proper inſtrument, in order to make a depending orifice for the matter to flow through; and to make way for ſyringing the parts affected with proper interjection, which in this caſe are thrown thro' the cavity into the noſe.

The ſimilarity of theſe two caſes, with the method of cure, and the ſucceſs attending the ſurgical treatment (which was firſt invented and perfected by our countrymen Drake and Cowper) undoubtedly gave the firſt hint for

for trepanning, and ſyringing theſe cavities in horſes; and it is moſt probable, that when the operation is attempted in time, before the bones become rotten, it will be attended with equal ſucceſs; but after opening the cavities, ſhould it by probing be diſcovered, that the bones are in that ſtate, the beſt way then would be to diſpatch the horſe, to prevent unneceſſary trouble and expence.

The parts fixed on for applying the trepan are pointed out in the plate, and the manner of ſawing out the bone will eaſily be underſtood by a view of the inſtrument, and the explanation annexed.

The perforations being made, our next buſineſs is to prevent their filling up too faſt, as it may be neceſſary to keep them open for ſome weeks before a cure can be effected; for which purpoſe, after the uſe of the injection, let the upper one be filled up with a piece of cork, waxed over, and adapted exactly to its ſize, the lower one may be kept open with a hollow leaden tent, through which there will be a conſtant drain of matter from the ſinuſſes, which will be greatly favoured by this depending orifice, and both be detained by a proper bandage.

If this method ſhould not prevent the granulations, or ſhoots of the fleſh, from filling up ſo faſt as to choak up the perforation, and by that means hinder the injections paſſing freely, they muſt be ſuppreſſed by rubbing with cauſtic medicines, or touching with the actual cautery; as may alſo the bony edges, which, by obliging them to exfoliate or ſcale off, will retard the healing.

The injection firſt made uſe of, ſhould be of a deterſive nature; as a decoction of birth-wort, gentian, and centaury; to a quart of which, if two ounces of Ægyptiacum and tincture of myrrh are added, it may be as proper as any; and when the diſcharge is obſerved to abate, and the colour alter to a thick white matter, the injection may be changed for barley-water, honey of roſes, and tincture of myrrh; and, finally, to dry up the humidities, and recover the tone of the relaxed glands, Bate's allum-water, or a ſolution of colcothar, vitriol, lapis medicamentoſus, or ſuch like, in lime-water, will moſt probably complete the cure. Dr. Bracken recommends the following:

> Take of allum and white vitriol powdered, of each four ounces, calcine them in a crucible when cold, powder the calx, and mix it with a gallon of lime water and a quart of vinegar, decant the clear for uſe.

But whoever is at all acquainted with practical ſurgery, well knows, that without the aſſiſtance of internals, eſpecially in glandular diſorders, the cure is not ſo eaſily effected, nor rendered complete or laſting: we therefore adviſe a ſtrong decoction of guaicum chips to be given every day, to a quart or three pints, throughout the cure, and when the matter leſſens, to purge at proper intervals, and put a rowel into the horſe's cheſt, in order to divert the fluids from their old channel: if theſe ſhould not ſucceed, mercurials may be given with the phyſic, and the alterative powders with lime-water may be taken for a time, if the horſe is worth the expence.

An Explanation of the Heads and Trepan. See Plate XVII. *Fig.* 2.

B. B. two lines repreſenting the bounds of the cerebellum, or back part of the brain, which is very ſmall in a horſe, in proportion to that of a man, as well as the brain itſelf, which commences from the line D.

C. C. a line where the ſuperior part of the ſinus frontalis commences, together with a view of the bottom of the ſinus, which terminates between the lines D and E, where there appears a ſubſtance in the form of a pear, which is the os ethmoides, or ſieve-like bone, through which the olfactory nerves paſs, by which the petuitary membrane receives its ſenſibility, and the ſenſe of ſmelling is performed.

E. repreſents the beginning of the maxillary ſinus, which terminates at M.

The ſhaded ſpace, which may be obſerved between theſe two lines, repreſents the great cavities. The oblique ray marked F, is a bony partition, which ſeparates this ſinus into two parts, that have no communication; and ſometimes it happens (though but rarely) that there are two bony partitions; and for this reaſon they are repreſented by the lines marked F and G. It alſo ſometimes happens (but ſtill more ſeldom) that there are horſes, in whoſe heads we do not find any of theſe bony partitions.

N. points out the place of the cornets or horns. O the redoublings. P their middle part. Q the inferior part of them. M the bony canal or pipe which guards the maxillary nerve.

A. A. the ſeptum narium, or partition, which divides the noſe from top to bottom, and conſtitutes the two noſtrils.

L, in the head that is intire, points out where the trepan ſhould be applied on the frontal ſinus, when we have reaſon to believe the glanders is ſpread into this ſinus. However, I think it ſafeſt to apply it firſt on E, for the reaſons mentioned in the next explanation, and becauſe the brain may be endangered, ſhould the ſinus be miſtook.

E, the place where the trepan may be applied, in order to cleanſe the maxillary ſinus. The round mark between D and E (which is the impreſſion of the trepan) is, however, on experience, preferred by the author, as the propereſt place, as one orifice would then be ſufficient to waſh all the parts, both above and below, with the injection.

But in general, when the maxillary ſinus is only affected, penetrate but the upper part, where the ſyringe points, or thereabouts, and your expectations will be anſwered; ſhould they not, there ſeems ſo little danger in the operation, that you may again perforate at the places above-mentioned, higher up. But a proper number of experiments will ſoon ſettle this point with certainty.

H, in the head that is intire, points out the place where another hole, or perforation ſhould be made, as a drain to give iſſue to the glanderous matter waſhed away by the injection which could not be diſcharged without ſuch a depending orifice; and perhaps this perforation alone, in many recent caſes, would be ſufficient, provided the injection paſſed freely upwards, and the hole was kept open by means of a hollow leaden pipe conſtantly retained in it for that purpoſe, and to procure a free paſſage for the matter.

I, repreſents the injection puſhed in by the ſyringe, which flows out by the orifice and the noſtril K; during the uſe of the ſyringe, it is neceſſary to hold the noſtrils cloſe.

If, in the maxillary ſinus, inſtead of one there happens to be two bony partitions, it is abſolutely neceſſary to pierce through them both, by means of a ſtiletto, or ſharp-pointed tuck, as in the manner repreſented in the cut of a horſe's head opened, though this conformation ſeldom occurs.

As theſe bony partitions may in ſome particulars vary, ſhould the ſtiletto not have the deſired effect, and the injection thrown in by the ſyringe not come out at H; in ſuch caſe the liquor ſhould be injected upwards, through the orifice made by the ſtiletto or trepan at H.

As in young horſes the frontal and maxillary ſinuſſes are very ſmall, it will be proper to direct the trepan towards the interior part of the noſe, otherwiſe the inſtrument might work upon the roots of the teeth, which incline towards the ſinus, and would in ſuch caſe be an inſurmountable obſtacle to the operation.

R, the inſtrument or trepan. S, the handle which turns it. T, the ſaw-part to be applied to the bone.

From a view of this inſtrument, the manner of working it will appear ſimple and eaſy; the cooper's managing his wimble being a proper directory.

The inſtrument called the trephine, which is chiefly uſed by our Engliſh ſurgeons in perforating the ſkull, will equally anſwer this purpoſe; and if any difficulties ſhould ariſe, notwithſtanding this deſcription, the gentlemen of the faculty will ſoon make it familiar and intelligible.

Before the application of the trepan, or trephine, it is quite neceſſary to obſerve, that a circular piece of the ſkin ſhould firſt be cut off, with the membrane which covers the bone, about the ſize of a half-crown-piece, in order to make the inſtrument work the eaſier, and to prevent the inconveniencies which might ariſe from the external wounds healing up too faſt.

The ſyringe ſhould be large enough to contain half a pint of injection.

GLANDIFEROUS, an epithet applied to ſuch trees as bear maſt or acorns. Thus the oak, beech, &c. are called glandiferous trees.

GLEANING, the action of picking up the ears of corn left behind by the gatherers.

GLEBE, properly ſignifies the ſoil or ground in general; but is particularly applied to the land poſſeſſed as part of the revenue of an eccleſiaſtical benefice.

GLEBOUS, or *gleby*, turfy.

GLEDE, a kite.

GLEN, a valley, a dale.

GLYSTER, or *Clyſter*, a medicine injected into the anus of an animal.

Glyſters are often neceſſary for horſes in various diſorders, and may be reduced to theſe different kinds, viz. laxative and emollient, purgative and reſtringent.

But it ſhould, be obſerved that before the adminiſtration of emollient glyſters in coſtive diſorders, a ſmall hand well oiled ſhould be paſſed up the horſe's fundament, in order to bring away any hardened dung, which otherwiſe would be an obſtacle to the clyſter's paſſage.

A bag and a pipe of a proper form, is to be preferred to a ſyringe, which throws up the clyſter with ſo much force, that it often ſurpriſes a horſe, and makes him reject it as faſt as it goes in: whereas the liquor, when preſſed gently from the bag, gives him no ſurprize or uneaſineſs, but paſſes up eaſily into the bowels, where it ſometimes remains a long time, and is extremely uſeful, by cooling and relaxing them; and will ſometimes incorporate ſo with the dung, as not eaſily to be diſtinguiſhed from the other contents of the guts. Theſe emollient clyſters are extremely ſerviceably in moſt fevers, and greatly preferable to purging ones; which in general are too pungent, and ſtimulate too much, eſpecially if aloes are a part of the compoſition.

Nutritive clyſters are very neceſſary, and often ſave a horſe from ſtarving, when his jaws are ſo locked by convulſions, that nothing can be conveyed by the mouth.

They ſhould not exceed a quart or three pints at a time, but be often repeated: nor ſhould they be too fat; but made of ſheeps-heads, trotters, or any other meat-broths, milk-pottage, rice-milk ſtrained, and many other ſuch nouriſhing things. For an emollient clyſter take the following:

Take marſhmallows and chamomile flowers, each a large handful; bay-berries and ſweet fennel-ſeeds bruiſed, each an ounce, boil in a gallon of water to three quarts, pour off into a pan, and diſſolve in it half a pound of treacle, and a pint of linſeed oil, or any common oil.

To make it more laxative, add four ounces of lenitive electuary, or the ſame quantity of cream of tartar, or common purging ſalts.

Take two or three handfuls of marſhmallows, ſenna one ounce, bitter-apple half an ounce, bay-berries and anniſeed bruiſed, each an ounce, ſalt of tartar half an ounce; boil a quarter of an hour in three quarts of water, pour off, and add four ounces of ſyrup of buck-thorn, and half a pint of oil.

This clyſter will purge a horſe pretty briſkly; and may be given ſucceſsfully, when an immediate diſcharge is wanting; eſpecially in ſome fevers with inflamed lungs, or other diſorders, which require ſpeedy relief.

But it is neceſſary to caution againſt a ſolution of coarſe aloes for this purpoſe, as it has been found to gripe horſes violently, and excite feveriſh, and ſometimes convulſive ſymptoms; and indeed all pungent and ſtimulating medicines, as the ſtronger purgatives generally are, ſhould be given in this form with great caution.

But the generality of emollient clyſters may be prepared with much leſs trouble; as two quarts of water-gruel, with half a pound of treacle, a pint of oil, and a handful of common ſalt, will as effectually anſwer every purpoſe. The following is a reſtringent clyſter.

Take pomegranate-bark, or oak-bark, two ounces; red roſe-leaves, freſh or dry, a handful; baluſtines, an ounce; boil theſe in two quarts of water, till one is nearly conſumed; then pour it off, and diſſolve in it four ounces of diaſcordium; to which may be added a pint of Port-wine.

This will anſwer all common caſes, where reſtringents are neceſſary, but ſhould never be given in larger quantities; for the longer clyſters of this kind lie in the bowels, the more efficacious they are. *Bartlet's Farriery, page* 22.

GOAD, a pointed inſtrument with which oxen are driven forward.

GOAR-VETCHES, the ſame with ſummer-vetches. *See the article* VETCHES.

GOAT, a genus of animals, the characters of which, according to Mr. Ray, are theſe; that it is covered with hair, not with wool; that its horns are leſs crooked than thoſe of a ſheep, and that it has a beard hanging down from its chin, and is of a ſtrong ſmell.

It is very ſingular that this genus of animals are all able to run and climb about the rugged parts of mountains without falling, though their feet ſeem by no means contrived by nature for any ſuch purpoſes.

Goats may be of great advantage to the farmers in ſome parts of the kingdom, as they will live in rocky barren countries, where nothing elſe can get a ſupport for life. They will climb the ſteepeſt rocks, and there browſe upon briars, heath, and ſhrubs of various kinds, which other creatures will not taſte of. They will feed on graſs in paſtures; but, as they love browſing on trees much better, great care muſt be taken to keep them from valuable plantations.

The greateſt advantage of theſe creatures is their milk, which they yield in large quantities: and which is accounted the beſt milk of all animals. They mix this and cows milk together in many parts of the kingdom, and a very valuable kind of cheeſe is made of it. Beſide this, the kids or young goats are very fine food, and the beſt kinds bring forth theſe two or three at a time, and that twice a year.

Goats hair alſo is valuable; it may be ſheared as the wool from ſheep, and is excellent for making ropes that are to be uſed in the water, as they will laſt a great while longer than thoſe made the common way. A ſort of ſtuff is alſo made of it in ſome places. The beſt kind of goats for keeping to advantage ſhould be choſen in this manner: the male ſhould have a large body, his hair ſhould be long, and his legs ſtraight and ſtiff; the neck ſhould be plain and ſhort, the head ſmall and ſlender, the horns large, the eyes prominent, and the beard long. The female ſhould have a large udder, with large teats, and no horns, or very ſmall ones. They ſhould be kept in flocks, that they may not ſtraggle; and they ſhould have good ſhelter both in ſummer and in winter, the heat and cold being both prejudicial to them. They ſhould be coupled in December. They ſhould have no litter in winter, but only a paved floor kept clean. The kids are to be brought up for the table in the ſame manner as our lambs are. They are recommended to lie among horſes, their ſmell, as ſuppoſed, preventing many diſtempers in thoſe cattle. *Mortimer's Husbandry, vol.* I. *page* 244.

GOD's-GOOD, yeaſt, or barm.

GOFFE, the ſame with geoff. *See* GEOFF.

GOOL, a ditch.

GOOSE. *See the article* GEESE.

GOOSE-GRASS, or wild tanſy, the name of a troubleſome weed very frequent in clay-grounds. The beſt method of deſtroying it is to mow it in ſummer, well dung the land, and never plough it out of heart.

GOSS, or *Gorſe*, the furze.

GOULANS, corn-marigolds.

GRAIN, a general name for all ſorts of corn, as wheat, barley, &c.

GRANARY, a building to lay or ſtore corn in, eſpecially that deſigned to be kept a conſiderable time.

Experimental philoſophy has proved, that the air is the great ſource of corruption; keep out that, and all is kept out; and the moſt corruptible ſubſtances, ſuch as meal, butter, milk, and the like, have been preſerved freſh four months in the exhauſted receiver of an air-pump.

They have, near Grand Cairo, a magazine or granary, defended with good walls, and called Joſeph's granaries. It is not probable that they are quite ſo old as the days of that patriarch; but they abundantly prove the utility of ſuch ſtore-houſes, by the vaſt quantities of grain annually preſerved in them.

Many parts of Africa abound with granaries of this kind.

They are ſo many deep pits made in the ſolid rock; the deſcent into them is but juſt large enough for a man to go down into them; but they grow larger as ſoon as the perſon is in, and are uſually ſquare, from thirty to forty feet in diameter. In theſe the great men of the country preſerve their corn; they firſt ſtrew over the floor with ſtraw, then they lay on the corn, ſtill as the heap riſes, placing a thin bed of ſtraw between the corn and the ſides, as they did at the bottom. In this manner they proceed till the whole cavity is filled: when this is done, they cover the mouth of the entrance with a ſort of hurdle of green boughs of trees, interwoven one with another. This they cover with about two feet thickneſs of ſand, and over this raiſe a ridge of earth, well beat together, in order to throw off the rain both ways, that none may ſettle on the place and ſoak into the magazine.

The corn thus ſtored up always keeps three, four, or more years very good; and, not unfrequently, the proprietor being taken off by the ſeverity of the eaſtern governments, under which they live, the magazine is forgotten, and ſome accident diſcovering it many years afterwards, the corn is almoſt always found perfectly good in it. All the care they take, in regard to the corn, is to expoſe it two or three days to the ſun's heat, to dry it, thoroughly, before they carry it into a magazine.

In the dutchy of Lithuania, and in the Ukraine, the people always preſerve their corn in the ſame manner in wells or pits made in dry places: but in theſe countries great care is to be taken in the opening theſe ſtore-rooms; for if people deſcend into them before they have had ſufficient communication with the freſh air, they are often killed by the damps; this, however, is eaſily guarded againſt. By theſe, and numerous other inſtances of the practice of other countries, it appears evident, that the advantage of theſe ſubterranean granaries over all others is very great.

Though theſe are to be recommended before all others, yet the common granaries may, with proper care, be rendered greatly more uſeful than they are at preſent. The grand caution neceſſary to this purpoſe is, to guard againſt the too great humidity, which there always is in places where there is a great number of doors and windows. A too free acceſs of the external air is alſo to be carefully guarded againſt; for this brings in with it the eggs of a vaſt number of different inſects, which prey upon, and deſtroy the corn. A third caution is, when the corn is the produce of the country where it is preſerved, not to fill the place with the crop of one place only, but to mix the harveſts of two as different provinces as may be, the one dry, the other moiſt, or otherwiſe differing as much as may be; thus the contrary qualities of the one will pre-

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vent the deſtruction of the other. Theſe are the three great rules to prevent the corrupting of corn; but when the miſchief is once begun, it will prove very difficult to ſtop it; all the care that can be employed, ſhould therefore be taken in regard to theſe.

The two great cautions to be obſerved in the erecting of granaries, are to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. The ordering of the corn in many parts of England is thus: to ſeparate it from duſt and other impurities after it is threſhed, they toſs it with ſhovels from one end to the other of a long and large room; the lighter ſubſtances fall down in the middle of the room, and the corn only is carried from ſide to ſide, or end to end of it. After this they ſcreen the corn, and then, bringing it into granaries, it is ſpread about half a foot thick, and turned from time to time about twice in a week; once a week they alſo repeat the ſcreening it. This ſort of management they continue two months, and after that they lay it a foot thick for two months more, and in this time they turn it once a week, or twice, if the ſeaſon be damp, and now and then ſcreen it again. After about five or ſix months, they raiſe it to five or ſix feet thickneſs in the heaps, and then they turn it once or twice in a month, and ſcreen it now and then. When it has lain two years, or more, they turn it once in two months, and ſcreen it once a quarter, and, how long ſoever it is kept, the oftener the turning and ſcreening is repeated, the better the grain will be found to keep.

It is proper to leave an area of a yard wide on every ſide the heap of corn, and other empty ſpaces, into which they turn and toſs the corn, as often as they find occaſion. In Kent they make two ſquare holes at each end of the floor, and one round in the middle, by means of which they throw the corn out of the upper into the lower rooms, and ſo up again, to turn and air it the better. Their ſcreens are made with two partitions, to ſeparate the duſt from the corn which falls into a bag; and when ſufficiently full, this is thrown away, the pure and good corn remaining behind.

Corn has, by theſe means, been kept in our granaries thirty years; it is obſerved, that the longer it is kept, the more flour it yields in proportion to the corn, and the purer and whiter the bread is, the ſuperfluous humidity only evaporating in the keeping. At Zurich, in Swiſſerland, they keep corn eighty years or longer, by the ſame ſorts of methods.

The public granaries at Dantzick are ſeven, eight, or nine ſtories high, having a funnel in the midſt of every floor, to let down the corn from one to another. They are built ſo ſecurely, that though every way ſurrounded with water, the corn contracts no damp, and the veſſels have the convenience of coming up to the walls for their lading. The Ruſſians preſerve their corn in ſubterranean granaries, of the figure of a ſugar-loaf, wide below, and narrow at top: the ſides are well plaiſtered, and the top covered with ſtones. They are very careful to have the corn well dried before it is laid into theſe ſtore-houſes, and often dry it by means of ovens, their ſummer dry weather being too ſhort to effect it ſufficiently.

GRANGE, a houſe or farm furniſhed with granaries and barns for holding corn, ſtables for horſes, ſtalls for cattle, &c.

GRANIFEROUS *Pods*, are ſuch as contain ſmall ſeeds reſembling grain.

GRANIVOROUS, an epithet given to animals that feed on corn or ſeed.

GRASS, a general name for moſt of the herbaceous plants uſed in feeding cattle.

The beſt ſeaſon for ſowing graſs-ſeed is the latter end of Auguſt, and the beginning of September, that the graſs may be well rooted before the froſt ſets in, which is apt to turn the plants out of the ground, when they are not well rooted. This ſeed ſhould be ſown in moiſt weather, or when there is a proſpect of ſhowers, which will ſoon bring the graſs up; for, the earth being at that ſeaſon warm, the moiſture will cauſe the ſeed to vegetate in a few days: but, where this cannot be performed in autumn, the ſeeds may be ſown in the ſpring; towards the middle of March will be a good time, if the ſeaſon proves favourable.

The land on which graſs-ſeed is intended to be ſown, ſhould be well ploughed, and cleared from the roots of noxious weeds, ſuch as couch-graſs, fern, ruſhes, heath, gorſe, broom, reſt-harrow, &c. which, if left in the ground, will ſoon get the better of the graſs, and overrun the land. Therefore, in ſuch places where either of theſe weeds abound, it will be a good method to plough up the ſurface in April, and let it lie ſome time to dry; then lay it in ſmall heaps, and burn it. The aſhes ſo produced, when ſpread on the land, will be a good manure for it. The method of burning the land is particularly uſeful; eſpecially, if it is a cold ſtiff ſoil; but where couch-graſs, fern, or reſt-harrow, is in plenty, whoſe roots run far under ground, the land muſt be ploughed two or three times pretty deep in dry weather, and the roots carefully harrowed off each ploughing; which is the moſt ſure method to deſtroy them. Where the land is very low, and of a ſtiff clayey nature, which holds water in winter, it will be of ſingular ſervice to make ſome under-ground drains to carry off the wet; which if detained too long on the ground, will render the graſs ſour. The method of making theſe drains is preſcribed under the article DRAINING.

Before the ſeed is ſown, the ſurface of the ground ſhould be made level and fine, otherwiſe the ſeed will be buried unequal. The quantity of graſs-ſeed for an acre of land is uſually three buſhels, if the ſeed is clean, otherwiſe there muſt be a much greater quantity allowed; when the ſeed is ſown, it muſt be gently harrowed in, and the ground rolled with a wooden roller; which will make the ſurface even, and prevent the ſeeds being blown in patches. When the graſs comes up, if there ſhould be any bare ſpots, where the ſeed has not grown, they may be ſown again, and the ground rolled, which will fix the ſeeds; and the firſt kindly ſhowers will bring up the graſs, and make it very thick.

Some people mix clover and rye-graſs together, allowing ten pounds of clover, and one buſhel of rye-graſs, to an acre: but this is only to be done where the land is deſigned to remain but three or four years in paſture, becauſe neither of theſe kinds are of long duration; ſo that, where the land is deſigned to be laid down for many years, it will be proper to ſow with the graſs-ſeed ſome white trefoil, or Dutch clover; which is an abiding plant, and ſpreads cloſe on the ſurface of the ground, ſending forth roots at every joint; and makes the cloſeſt ſward of any, and is the ſweeteſt ſeed for cattle: ſo that, whenever land is laid down to paſture, there ſhould always be ſix or eight pounds of this ſeed ſown upon each acre.

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The following ſpring, if there ſhould be any thiſtles, ragwort, or ſuch other troubleſome weeds, come up among the graſs, they ſhould carefully be cut up with a ſpaddle before they grow large; and this ſhould be repeated two or three times in the ſummer, which will effectually deſtroy them; for, if theſe plants are ſuffered to ripen their ſeeds, they will be blown all over the ground; their ſeeds having down adhering to them, which aſſiſts their tranſportation; ſo that they are often carried by the wind to a great diſtance, and thereby become very troubleſome weeds to the graſs. For want of this care, how many paſtures may be ſeen almoſt over-run with theſe weeds, eſpecially the ragwort; when a ſmall expence, if applied in time, would have intirely extirpated them! for a man may go over ſeveral acres of land in one day with a ſpaddle, and cut up the weeds juſt below the ſurface of the ground, turning their roots upwards; which if done in dry weather, they will ſoon decay; but this muſt always be performed before the plants come to have their ſeeds formed; becauſe after that many ſorts will live long enough to nouriſh their ſeeds after they are cut, ſo as to ripen them: and there will be a ſupply of weeds for ſome years after, which cannot be extirpated without a much greater expence.

The proper management of paſture land is the leaſt underſtood of any part of agriculture: the farmers never have attended to this, being more inclined to the plough; though the profit attending that has not of late years been ſo great as to encourage them in that part of huſbandry: but theſe people never think of laying down land for paſture, to continue longer than three years: at the end of which time they plough it up again, to ſow it with grain.

Their uſual method is to ſow rye-graſs and trefoil with barley, when they intend to lay down the ground; or ſometimes ſow only clover with the barley; nor is it poſſible to convince theſe people of their error in ſowing corn with this graſs; which they affirm to be uſeful in ſhading the graſs, not conſidering how much the corn draws away the nouriſhment from the graſs: but it is in vain to write to theſe people, who are not to be convinced, either by argument or experiment; ſo much are they led by cuſtom, as not to be led or driven out of their own methods; but, as their practice of huſbandry has greatly leſſened the circumſtances of the farmers, ſo that the lands are daily falling into the hands of the owners, therefore this part of huſbandry ſhould by them be principally attended to, as it may be carried on with much leſs expence: for paſture land requires but few hands to manage; whereas the ſowing of corn is attended with great expence, and the profit is very precarious: but when this is attended with ſucceſs, and the grain at a moderate price, if the whole labour is to be paid for, there will be little coming to the owner for rent, when the balance is fairly ſtated; but in this moſt gentlemen deceive themſelves, and often ſuppoſe they gain by farming, when, perhaps, the whole rent of the land is loſt: therefore, to avoid the trouble which attends this ſort of huſbandry, it will be the beſt method to turn as much of their land into paſture as they can; which, by grazing and feeding ſheep, will be attended with little expence, and a ſure profit.

It is not uncommon for the huſbandman, for want of diſtinguiſhing graſſes for ſeed, to fill his ground with either weeds or bad and imperfect graſſes. Whereas by making a proper choice, he would always have the beſt graſs, and in the greateſt abundance his land will admit of.

In the common way of proceeding, if a farmer wants to lay down his land to graſs, he either takes his ſeeds indiſcriminately from his own foul hay-rick, or ſends to his neighbour for a ſupply. By this means, beſides a certain mixture of rubbiſh, which muſt neceſſarily happen; it is not unlikely but that what he intends for dry land may have come from moiſt, where it grew naturally, and ſo on the contrary: and the conſequence of this ſlovenly method frequently is, that the ground, inſtead of being covered in one year with a good ſward, is filled with weeds not natural to it, which would never have ſprung up, if they had not been brought thither.

"Arguments, ſays Mr. Stillingfleet, are never wanting in ſupport of ancient cuſtoms, and I am no ſtranger to thoſe, ſuch as they are, which prejudice and indolence have made uſe of on this occaſion.

"1. Some ſay then, that if you manure your ground properly, good graſſes will come of themſelves. I own they will. But the queſtion is, how long it will be before that happens: and why be at the expence of ſowing what you muſt afterwards try to kill? which muſt be the caſe, ſo long as people ſow all kinds of rubbiſh under the name of hay-ſeeds. Again, if the beſt way is to let the ground take its chance, why is the farmer at the expence of procuring the ſeeds of the white and broad clover, which come up in almoſt all parts of England ſpontaneouſly? But if this is allowed not to be the beſt way in relation to clover of any kind, what reaſon can be in nature, why graſs-ſeeds only ought not to be ſown pure?

"2. Others ſay, that it is better to have a mixture of different ſeeds. I will ſuppoſe this to be true. But cannot a mixture be had though the ſeeds be gathered, and ſeparated? and is not a mixture by choice more likely to be proper, than one by one chance; eſpecially after a ſufficient experience has been had of the particular virtues of each ſort, of the different kinds of cattle which each graſs is moſt adapted to, of the different grounds where they will thrive beſt, &c. all which circumſtances are now, in general, wholly unknown, though of the utmoſt conſequence?

"3. It is ſaid by ſome, that weeds will come up along with the graſs. No doubt of it. Can any one imagine, that graſs-ſeeds ſhould be exempted from what happens to every other kind of ſeeds? But I will venture to ſay, that not near the quantity of weeds will ſpring up which they imagine, if the graſs be ſown very thick. Men muſt be very much put to it, when they make ſuch objections as this laſt, or indeed any of the others. I am almoſt inclined to ſay with a great writer. 'It is a ſimple thing to take much pains to anſwer ſimple objections.'

"One would hardly think it poſſible, that the ſlovenly method of proceeding, here complained of, could prevail univerſally: yet this is the caſe as to all graſſes, except the darnel (or rye) graſs, and what is known in ſome few countries by the name of the Suffolk-graſs; and this latter inſtance is owing, I believe, more to the ſoil than to any care of the huſbandmen. Now, would the farmer be at the pains of ſeparating, once in his life, half a pint, or a pint, of the different kinds of graſs-ſeeds, and take care to ſow them ſeparately, in a very little time he would have wherewithal to ſtock his farm properly, according to the nature of each ſoil, and might at the ſame time ſpread theſe ſeeds properly over the nation, by ſupplying the ſeed-ſhops.

"I have

"I have had frequent experience how eaſy it is to gather the ſeeds of graſſes, having ſeveral times employed children of ten or eleven years old, who have gathered many ſorts for me without making any miſtakes, after I had once ſhewn them the ſorts I wanted.

"I have procured thus the creeping bent, the fine bent, the ſheep's feſcue, the creſted dog-tail, &c. in ſufficient quantities, to begin a ſtock; but, for want of a proper opportunity of cultivating them myſelf, or meeting with any one who had zeal enough to beſtow a proper care on them, my collections of this kind hitherto have only proved, that the ſcheme is in itſelf feaſible.

"In the year 1761, a little boy gathered, by my directions, as much of the creſted dog-tail, in three hours, by the ſide of a road, as when ſhed, yielded, upon weighing, above a quarter of a pound averdupois, perfectly free from huſks. As this ſeed is ſmall, the ſkilful will eaſily judge how far ſuch a quantity would go if properly employed.

"My very eſtimable and ingenious friend Mr. Aldworth, who was witneſs of the fact which I laſt mentioned, at my deſire, ordered a ſmall part of a meadow, near his ſeat at Stanlake, which had better graſſes, and leſs mixed, than the reſt, to be left unmowed till the ſeeds were fit for gathering. This piece yielded, upon threſhing and ſifting, a full buſhel by meaſure, of almoſt pure ſeed of the creſted dog-tail.

"In caſe any one ſhould be inclined to follow this example, I think it highly neceſſary to obſerve, that care muſt be taken to mow the graſs before it ſheds; that it be mowed very early in the morning, before the dew is off the ground, and that it ought not to be ſpread as in making hay, but left as it falls from the ſcythe during a ſufficient time, and then be gently turned over.

"The number of graſſes fit for the farmer is, I believe, very ſmall; perhaps half a dozen, or half a ſcore, are all he need to cultivate; and how ſmall the trouble would be of collecting the ſeeds of theſe, and how great the benefit, muſt be obvious to every one at firſt ſight. Would not any one be looked upon as wild, who ſhould ſow wheat, barley, oats, rye, peaſe, beans, vetches, buck-wheat, turneps, and weeds of all ſorts together? Yet how is it much leſs abſurd to do what is equivalent in relation to graſſes? does it not import the farmer to have good hay and graſs in plenty? and will cattle thrive equally on all ſorts of food? We know the contrary. Horſes will ſcarcely eat hay that will do well enough for oxen and cows. Sheep are particularly fond of one ſort of graſs, and fatten upon it faſter than any other in Sweden, if we believe Linnæus. And may they not do the ſame in England? How ſhall we know till we have tried? Nor can we ſay, that what is valuable in Sweden, may be inferior to many other graſſes in England, ſince it appears by the Flora Suecica, that they have all the good ones that we have. But however this may be, I ſhould rather chooſe to make exeriments than conjectures."

The Society for promoting Agriculture, &c. in the province of Brittany, has laid down the moſt rational plan yet formed by any body of men, nobly aſſociated for the welfare of their country, and which promiſes the greateſt advantages to mankind. A part of this plan is the cultivating ſeparately moſt of the plants which grow naturally in the fields there, in order to know which of them will afford the moſt and the beſt food for cattle.

As the huſbandman would not be benefitted by knowing the particular claſſes, genera, &c. under which Ray, Linnæus, and other botaniſts have ranged the ſeveral ſpecies of graſſes, we ſhall here give the names of ſuch of them as may be cultivated to moſt advantage in this country, with the beſt drawings (for which we are indebted to Mr. Stillingfleet) of ſome of the moſt profitable ſorts, which it will be of ſervice to the farmer to be able to diſtinguiſh rightly.

The common dogs-graſs, quich-graſs, or couch-graſs, (*Gramen ſpicâ triticeâ repens vulgare, caninum dictum*) common creeping-graſs, with a ſpike like wheat, called dogs-graſs, will thrive in almoſt any ſoil, and can ſcarcely be got out again, after it has once taken poſſeſſion: ſo greatly does it multiply by its roots and trailing branches, which put forth roots and ſhoots at every joint. It grows to the height of four or five feet, with blades ſo rough and coarſe, that few horſes will eat them, eſpecially while they are green: but it yields abundant crops of hay, which does well enough for oxen, and therefore deſerves, perhaps, more attention than our farmers have yet beſtowed upon it. M. Duhamel indicates the beſt way of making the moſt of it, when he directs the farmer always to mow it before its ſeeds ripen, or its ſtalks grow hard; for after that cattle refuſe it; adding, that it ſoon ſhoots up again, and will bear frequent cutting.

This plant is well known to all huſbandmen, to whom it is a ſad plague, when it gets into their arable land. It is the chiendent of the French, who, I muſt obſerve here for the benefit of their huſbandry, do not diſtinguiſh it ſufficiently from our

Rye-graſs, which is C. Bauhin's *Gramen loliaceum anguſtiore folio, et ſpica*, Darnel-graſs, with a narrower leaf and ſpike; and Linnæus's *Lolium ſpicâ muticâ*, Darnel with a chaffy ſpike: for darnel-graſs, rye-graſs, and ray-graſs, are only different names of one and the ſame plant: though M. Duhamel, miſlead by the erroneous ſpelling of ſome writers, who have called rye-graſs, ray-graſs, has been miſtakenly induced to think, that theſe are two different plants with us. We diſtinguiſh, indeed, two conſiderably different ſpecies of the rye-graſs, viz. the foregoing, which, according to Mr. Ray, is the *Lolium rubrum*, or red darnel; and the *Lolium album*, which, according to the ſame author, is C. Bauhin's *Gramen loliaceum ſpicâ longiore*, darnel-graſs, with a longer ſpike, and the yvraie of the French, by us commonly called darnel only. But both of them are equally rye graſs. It is the laſt of theſe ſpecies, viz. the *lolium album*, which is chiefly cultivated in England, eſpecially in ſtrong cold land, upon which it will ſucceed better than any other ſpecies, and is an earlier feed in the ſpring: but it is very coarſe; and unleſs it be cut quite early for hay, it becomes ſo hard and wirey in the ſtalks, that few cattle care to eat it: for this ſort of graſs has but few leaves, and runs all to ſtalks. When cattle have been turned in to feed upon it, the remaining ſtalks or bents, as they are ſometimes called, ſhould be mowed off in June; for otherwiſe they will dry upon the ground, give the paſture the diſagreeable appearance of a ſtubble field during all the latter part of the ſummer, and be ſo very troubleſome to the cattle which feed on it, by tickling their noſtrils, that nothing but the want of better grazing will compel them to eat of the young graſs which ſhoots up between theſe withered ſtems; for they will not eat them. Thoſe who think that they do, when ſtreightened for food, are greatly miſtaken, according to Mr.

Mr. Miller, who ſays, that he has cloſely attended to this many years, and has always found theſe bents remaining on the ground untouched, till the froſts, rain, and winds, have deſtroyed them in the winter. Beſides this, by permitting them to ſtand, the after-growth of the graſs is greatly retarded, and the beautiful verdure of the fields is loſt for three or four months. It therefore is good huſbandry to mow them cloſe to the ground, before they become too dry: and if this cutting is then made into hay, it will ſerve to feed cart-horſes in the winter, ſo as to repay the expence of mowing.

The red darnel is a conſiderably inferior ſpecies of rye-graſs; for it has yet narrower leaves, and its ſtalks grow hard much ſooner. It is very common in moſt paſture grounds, becauſe it flowers early, and its ſeeds ripen and and ſow themſelves before the hay is cut. They, therefore, who would keep their paſtures as clear as poſſible from this graſs, ſhould always mow them before its ſeeds are ripe.

Rye-graſs is uſually ſown with clover, upon ſuch lands as are deſigned to be ploughed again in a few years; and a common method is to ſow it with ſpring corn. But Mr. Miller, from many repeated trials, has always found, that when this graſs has been ſown in Auguſt, and a few ſhowers have fallen ſhortly after, the crop has been by much the beſt: for it then has often been ſo high as to afford a good feed the ſame autumn; and a ton and a half of hay has been mowed early the next ſpring on each acre of land, though it has been a cold and ſour ſoil. "I am, therefore, ſays he, convinced of that being the beſt ſeaſon for ſowing theſe graſſes; though it will be very difficult to perſuade theſe perſons to alter their practice, who have been long wedded to old cuſtoms. The quantity of ſeeds which I allow to an acre is about two buſhels, and eight pounds of the common clover, which, together, will make as good a covering upon the ground as can be deſired. But this is not to be practiſed upon lands where the beauty of the verdure is principally regarded. It is fitteſt for thoſe who have only profit in view." However, we muſt reckon as an abatement in this profit, that, as M. Duhamel rightly obſerves, the ground that has been under rye-graſs, which is not ſo profitable a crop as either lucerne, ſaintfoin, or even clover, is not able to bear wheat the next year, as it is after thoſe other plants, or after a crop of roots.

According to Mr. Liſle's information, the farmers in the Iſle of Wight prefer rye-graſs to hop clover, becauſe, ſay they, the rye-graſs will bear the winter, and keep to a good head, which the clover will not do. One of his tenants there had an acre and a half of rye-graſs upon tolerably good ground, which he ſhut up from Michaelmas till within a month of Candlemas, and from thence to the middle of April it kept fifteen ewes and fifteen lambs.

Rye-graſs ſeldom laſts more than three years, as it is commonly managed: but Mr. Liſle is ſtrongly of opinion, that, conſidering the nature of its roots, and its manner of propagating itſelf, by ſending forth fibres from its joints, it may be kept alive many years longer, by dunging it, or by refreſhing it with ſoil, when it begins to decay, after the ſecond or third year: beſides which, this will make its roots tiller, and mat on the ground, to the utter ſuppreſſion and deſtruction of all weeds, not excepting even the couch-graſs.

An acquaintance of his near Upcern, in Dorſetſhire, told him, that he had as much rye-graſs ſeed on eighteen acres of land, as was worth twenty pounds; and that, after the ſeed was threſhed out, that hay was better than oat-ſtraw fodder. Mr. Liſle himſelf ſaw a rick of this coarſe ſtubbed hay, and a rick of oat-ſtraw, both of which had been laid open to the cattle, in the ſame place; and they would not touch the ſtraw, but had made ſuch a hole in the rye-graſs hay-rick, that it was ready to fall. The ſame perſon aſſured Mr. Liſle, that he found the rye-graſs to be excellent food for his cattle, if it was mowed green, and not kept for the lucre of the ſeed. His uſual allowance was three buſhels of this ſeed to an acre of land, and he uſed to ſell it for twenty-two pence, or two ſhillings a buſhel.

Another farmer ſhewed Mr. Liſle ſome of his rye-graſs, ſaying, that he looked upon it as his choiceſt fodder for ſheep. He mowed it while in the flower; and Mr. Liſle declares, that he thought it very fine hay. Others again, and thoſe men of experience, have affirmed, that the very ſtubble of the rye-graſs, mowed the ſame year it was ſowed, is, when ploughed in, as good as dunging, and will pay for the ſeed.

Mr. Liſle agrees with all other experienced huſbandmen, that, though rye-graſs will maintain as many cattle on an acre as hop-clover will do; yet it does not, like it, improve the land for a ſubſequent crop of corn; the reaſon of which he takes to be, that the roots of the rye-graſs, conſiſting of a multitude of matty fibres, which run on the ſurface of the ground, gird and hold the earth ſo ſtrongly together, that they cannot eaſily be diſentangled from it by ploughing.

"If I may judge of this graſs, ſays Mr. Stillingfleet, by the veniſon I have eaten out of a paddock that was chiefly filled with this ſpecies, I would by no means recommend it for parks. I know it will be ſaid, that veniſon is never good out of paddocks, that the deer muſt have room to range, trees to browſe on, &c. I grant there is ſome reaſon for ſaying this, but I believe in general it is more owing to the want of proper food, viz. good graſs, than merely to confinement; for paddocks are generally made out of a rich ſpot of ground near the houſe, that has conſtantly been manured, and of courſe is full of graſs fitter for the dairy or the ſtable, than for deer; which hardly ever is the caſe in large parks. No man will, I ſuppoſe, pretend to make good pork from a hog fed with grains inſtead of peaſe, though he has the liberty of chooſing as much ground as he pleaſes, and where he pleaſes."

In a ſubſequent edition of his obſervations on Graſſes, he adds, "I have ſince eaten veniſon out of a large park, where there was much of this graſs, and it was no better than that out of the paddock. I ſhould be apt to think from hence, that this graſs would not be proper for ſheep, as I have always obſerved that the ſame kind of ground which yields good veniſon, yields alſo good mutton. For what particular uſes it is good, wants to be tried; whether for the dairy, for fattening cattle, or for horſes. Many are tempted, by the facility of procuring the ſeed of this graſs, to lay down with it grounds near their houſes, where they want to have a fine turf: but unleſs the ſoil be very rich, a worſe graſs cannot be choſen for this purpoſe, as it will certainly die off entirely in a very few years."

The wall-barley, or way-bennet, as ſome people improperly term it, is evidently from the ſhape of its ear, and from every other characteriſing circumſtance, a rye-

graſs, or wild rye, as Mr. Ray obſerves, though very different from the preceding. It is the *gramen ſecalinum et ſecale ſylveſtre*, called tall meadow rye-graſs by Mr. Miller, who reckons it an excellent graſs for ſowing, becauſe it is very leafy, its ſtalks do not become ſtiff and hard like many other ſpecies, and its roots are perennial. He ſeems not to doubt, but that it may be rendered very fine by proper care; and as its roots are perennial, rolling will make them mat ſo as to form a very cloſe ſward. There are three ſorts of it, viz. the greater, the leſſer, and the marſh rye graſs. Mr. Stillingfleet wiſhes, that this genus only were to be called rye graſs, and that the old name of darnel were continued to the *gramen loliacoum*, or rye graſs before ſpoken of.

The two beſt ſpecies of graſs for paſtures are, in Mr. Miller's opinion, C. Bauhin's *gramen pratenſe, paniculatum majus, anguſtiore folio*, meadow graſs, with large panicles, and a narrower leaf, which is the *poa paniculâ diffuſâ ſpiculis, quadrifloribus pubeſcentibus culmo erecto teretri*, Flor. Suec. 77. Poa with a diffuſed pannicle, the ſmaller ſpikes having four hairy flowers, and a taper erect ſtraw; and C. Bauhin's *gramen pratenſe, paniculatum majus, latiore folio*, meadow graſs, with a larger pannicle, and broader leaf which is the *poa paniculâ diffuſâ, ſpiculis trifloribus glabris, culmo erecto teretri*, Flor. Suec. 76. Poa with a diffuſed pannicle, ſmall ſpikes with three flowers, and an upright ſtraw.

Theſe ſeem to be the great meadow graſſes Mr. Stillingfleet obſerves are common in our beſt meadow grounds. He has alſo met with them frequently on banks by the road ſide, and near ditches, even where they were not to be found in the adjoining meadows and paſtures. But as he has not favoured us with a botanical deſcription of them, we can only form conjectures.

If the ſeeds of theſe two ſorts were carefully collected and ſown ſeparately, without any mixture of the ſeed of other graſs, they would not only afford a greater quantity of fodder on the ſame ſpace of land, but the graſs would alſo be better, the hay ſweeter, and the verdure more laſting, than that of any other ſpecies. Mr. Miller recommends this particularly to every gentleman who would improve the verdure near his habitation.

The annual meadow graſs makes the fineſt of turfs. It grows every where by way ſides, and on rich found commons. It is called in ſome parts the Suffolk graſs, as we mentioned before. Mr. Stillingfleet ſays, he has ſeen whole fields of it in High Suffolk, without any mixture of other graſſes, and as ſome of the beſt ſalt butter we have in London comes from that country, it is moſt likely to be the beſt graſs for the dairy. *See* ANNUAL MEADOW GRASS.

As the next beſt to meadow graſs, Mr. Miller recommends Ray's *gramen avenaceum pratenſe elatius, paniculâ flaveſcente, locuſtis parvis*, taller meadow oat-graſs, with a yellowiſh pannicle and ſmall huſks, which is the *avena paniculâ laxâ, calycibus trifloris brevibus, floſculis omnibus ariſtatis*, Prod. Leyd. 66. Oat graſs with a looſe pannicle, three flowers in each impalement, which is ſhort, and all the flowers having awns. Mr. Ray likewiſe recommends the ſmooth mountain oat-graſs, which he calls *gramen avenaceum montanum ſpicâ ſimplici, ariſtis recuroris*, found by Mr. Dale upon Bartlow hills in Eſſex, on the edge of Cambridgeſhire in the borders of the corn fields between Newmarket and Exning, and on the chalk hills between Northfleet and Graveſend; and the rough or hairy oat-graſs, which he diſtinguiſhes by the appellation of *gramen avenaceum birſutum, paniculâ purpuro argentiâ ſplendente*, and which abounds in the paſtures about the earl of Cardigan's houſe at Twittenham, in Middleſex. He alſo includes under this genus, all the feſtuca kinds, of which Mr. Stillingfleet gives the following account, in his Obſervation on Graſſes, ſubjoined to his tranſlations of ſeveral ingenious tracts, ſelected from the Tranſactions of the Academy of Upſal.

Sheep's feſcue, which he diſtinguiſhes by the name of *feſtuca ovina*, is the graſs moſt eſteemed for the food of ſheep in Sweden, where they have not ſuch downs as we have.

Gmelin ſays, that the Tartars chooſe to fix, during the ſummer, in thoſe places where there is the greateſt plenty of this graſs, becauſe it affords a moſt wholeſome nouriſhment to all kinds of cattle, but chiefly ſheep: and he obſerves, that the ſepulchral monuments of the ancient Tartars are moſtly found in places which abound with this graſs, which ſhews, adds he, that it has long been valued among them.

This graſs abounds in many parts of England and Wales, and particularly on all the fineſt ſheep paſtures in Herefordſhire, Oxfordſhire, Norfolk, &c. Mr. Stillingfleet obſerves, that it is a very early graſs, and that, contrary to what Linnæus, ſays, either ſheep or ſome other animals do eat the flowering ſtems of this graſs; for, when he ſearched for it upon Banſtead downs, he could ſee no part of it but the radical leaves, except among buſhes near the hedges, where it was guarded from the ſheep.

Mr. Stillingfleet ſays, that he has always ſeen the purple feſcue along with the fine bent and ſilver hair graſs, which will be ſpoken of hereafter, particularly on Banſtead downs, in great plenty, in a place incloſed in order to keep the ſheep out. From thence he is inclined to think, that this is the chief graſs all over the downs; but as the flowering ſtems in the other parts were intirely gone at the time of his viewing it, except along the hedges, he could not be certain in this reſpect.

After candidly declaring his want of knowledge of the qualities of the flote feſcue, which he calls *feſtuca fluitans*, Mr. Stillingfleet quotes a curious paſſage in the Tranſactions of the Academy of Upſal, where the author of a piece entitled *Plantæ Eſculentæ* ſays, that the ſeeds of this graſs are gathered yearly in Poland, and from thence carried into Germany, and ſometimes into Sweden, and ſold under the name of manna ſeeds, and that they are there much uſed at the tables of the great, on account of their nouriſhing quality and agreeable taſte. Mr. Stillingfleet then adds, that one Mr. Dean, a very ſenſible farmer at Ruſcomb, in Berkſhire, aſſured him, "that a field of about four acres, which always lay under water, and was occupied by his father when he was a boy, was covered with a kind of graſs that maintained five farm horſes in good heart, from April to the end of harveſt, without giving them any other kind of food, and that it yielded more than they could eat." Some of it was carried to Mr. Stillingfleet, who found it to be the flote feſcue, with a mixture of the marſh bent: but whether this laſt contributes much towards furniſhing ſo good paſture for horſes, ſeems doubtful to him. They both threw out roots at the joints of the ſtalks, and are therefore likely to grow to a great length.

Linnæus

Linnæus ſays, that the bran of this graſs will cure horſes troubled with bots, if they are kept from drinking for ſome hours.

In the index of dubious plants, at the end of Ray's Synopſis, mention is made of a graſs called *gramen caninum ſupinum longiſſimum*, longeſt ſupine dog's graſs, which grows at Maddington in Wiltſhire, and in ſome part, of Wales, to the length of twenty-four feet, and is uſed for the fattening of hogs. Its ſtalks are of the creeping kind, and touch the ground at ſeveral of their knots; for they do not riſe much in height. Mr. Stillingfleet thinks it the flote feſcue, and rightly adviſes farther enquiries concerning it. But he does not ſeem here to have conſulted Mr. Worlidge, who ſays, ſpeaking of this graſs, that it is extraordinarily ſweet, but not ſo eaſily propagated as hath been imagined, the length thereof being occaſioned by the waſhing of a declining ſheep down, from whence haſty rains bring with them much of the fatneſs of the dung of the ſheep, which ſubſides upon the ſmall meadows where this graſs grows: ſo that in ſprings not ſubject to theſe ſhowers, or on lands not enriched by that fertiliſing ſoil brought down to them, this graſs does not thrive ſo well.

The vernal graſs, which Mr. Stillingfleet calls *anthoxanthum odoratum*, and which is at leaſt a ſpecies of Ray's *gramen vernum ſpicâ brevi laxâ*, and of C. Bauhin's *gramen vernum pratenſe ſpicâ flaveſcente*, vernal graſs, with a looſe yellowiſh ſpike, is one of the earlieſt graſſes, and grows very commonly in all our meadows, paſtures, and other grounds. It is found in plenty upon thoſe paſtures which ſheep are fond of, and from whence excellent mutton comes; and therefore it is moſt likely to be a good graſs for ſheep paſtures. Mr. Stillingfleet ſays, he has found it on all kinds of grounds, from the moſt ſandy and dry to the moſt ſtiff and moiſt, and even in bogs. It is very plentiful in the beſt meadows about London, viz. towards Hampſtead, and Hendon; and its ſeeds may be gathered very eaſily, as it ſheds them upon the leaſt rubbing. This graſs gives a grateful odour to hay.

Mr. Liſle remarks, that the *gramen parvum repens purpureâ ſpicâ*, ſmall creeping graſs, with a purple ſpike, is no indication of bad ground, though it be a very bad graſs. Ray ſays, that it is very common in paſtures. There ſeems to be a great ſweetneſs in it. The ſame may be ſaid of the *gramen criſtatum*, or ſmooth creſted graſs, which alſo abounds every where in our meadows and paſtures.

The meadow fox-tail graſs (*gramen alopecuroides*) abounds in our beſt meadows about London, and makes very good hay; perhaps the beſt of any that is brought to market here. Mr. Stillingfleet obſerved in the ſpring of the year 1762, a meadow near Hampſtead which conſiſted of this graſs chiefly, with ſome of the vernal graſs and the corn-broom graſs: but it is ſcarce in many parts of England, particularly in Herefordſhire, Berkſhire, and Norfolk; though it might be gathered at almoſt any time of the year, even from hay-ricks, as it does not ſhed its ſeeds without rubbing, which is the caſe of but few graſſes.

The water fox-tail (*alopecuroides paludoſum*) is alſo found in ſuch meadows about London as are found and lie under water in the winter. Mr. Stillingfleet thinks it may, perhaps, be a proper graſs to ſow on ſuch grounds.

Mr. Stillingfleet has always found the fine bent-graſs, which he names *agroſtis capillaris*, in great plenty on the beſt ſheep paſtures, as on Malvern-hills, Bagſhot-heath, and all the high grounds in Herefordſhire, Berkſhire, Oxfordſhire, and Norfolk, and other places remarkable for good mutton.

The ſame may be ſaid of the mountain hair-graſs, which he calls *aira flexuoſa*; and of the ſilver hair-graſs, which is his *aira caryophillea*.

The quaking-graſs, cow-quake, or lady's hair, as it is called in ſome places, is the *gramen tremulum maximum*, of C. Bauhin, and J. Ray, and the *briza ſpiculis cordatis, floſculis ſeptendecim*, Hort. Cliff. 23. Briza with heart-ſhaped little ſpikes, and ſeventeen flowers in each. Though a very poor and ſlender graſs, Mr. Liſle thinks it no indication of poor land where it grows: for as Mr. Ray obſerves, it is the moſt common graſs of any in all the paſture grounds throughout England.

Mr. Miller deſcribes it as having an anual root, which ſends up many broad hairy leaves, between which ariſe ſlender ſtiff ſtalks, from a foot to near two feet high, dividing upward into a large looſe pannicle, garniſhed with heart ſhaped ſmall ſpikes, each having about ſeventeen ſmall floſcules, or florets; and theſe, after the flowers are paſt, are ſucceeded by a ſingle ſeed. The heads hang by ſlender long foot-ſtalks, which are moved by every wind, ſo that they generally appear ſhaking; from whence it had the name of quaking-graſs. There is a ſmaller ſpecies of it, which is a native of England; but, I believe, of no greater value than the former. Theſe graſſes come to head in May: and this gave riſe to the Engliſh proverb, May, come ſhe early come ſhe late, makes the cow quake.

Matweed (*gramen ſparteum*) is of the broom kind, and delights in ſandy places near the ſea. Even clouds of ſand blown over it do not hurt, but on the contrary promote its growth. It has been of excellent ſervice in fixing looſe ſands, as, if I have been rightly informed, it once did very remarkably in Norfolk. Of ten ſpecies of this plant, which Mr. Ray diſtinguiſhes, the following are the chief. 1. *Spartium Plinii, ſive juncus Hiſpanicus*, the true matweed of Pliny, or Spaniſh broom; 2. *Gramen ſparteum paniculâ brevi folliculo incluſâ*, hooded matweed; 3. *Gramen ſparteum marinum Anglicanum* Engliſh ſea matweed, or marram; 4. *Spartum maximum maritimum Hollandicum, ſpicâ ſecalinâ*, the greateſt Holland matweed; with a rye ſpike; 5. *Gramen ſparteum pennatum*, Feather-graſs; and 6. the *Gramen ſparteum juncifolium*, or *ſpartum parvum*, ſmall matweed.

Mr. Stillingfleet ſays, that the beſt mutton he ever taſted, next to that which comes from hills, where the purple and ſheep's feſcue, the fine bent, and the ſilver hair graſſes abound, was fed upon the creſted dog-tail graſs, which he and Mr. Hudſon call *cynoſurus cryſtatus*. He therefore rightly judges it proper for parks; and confirms this opinion, by adding, that he knows a park where this graſs abounds, which is famous for excellent veniſon. It makes a very fine turf upon dry, ſandy or chalky ſoils: but unleſs it be ſwept over with the ſcythe, its flowering ſtems will look brown; as is the caſe of all graſſes which are not fed by a variety of animals: for that ſome animals will eat the flowering ſtems, is evident from commons, where one ſcarcely ſees any part of the graſſes, except the radical leaves.

Mr. Miller thinks the cock's foot graſs (Ray's *Gramen dactylon*, Hiſt. p. 1271) the capon's-tail graſs Ray's *Gramen murorum ſpicâ longiſſimâ*, Hiſt. p. 1286) and the millet graſſes (*Gramina maliacea*) too coarſe to deſerve

attent'on in England; though ſome of their ſpecies are very uſeful in the warm parts of America, where there is a great ſcarcity of finer graſs, and even much better adapted for ſuch climates, than any of our European graſſes; becauſe many of them lie flat on the ground, and emit roots from their joints, by which means they are well prepared for heat; of which their large and juicy ſtalks likewiſe enable them to bear an extraordinary degree.

The purple, or as it is commonly called, red meadow trefoil, which is C. Bauhin's *Trifolium pratenſi purpureum*, has already been ſufficiently diſtinguiſhed from the common red clover, or red honey-ſuckle (Ray's *Trifolium purpureum majus, pratenſi ſimile, Sym.* 328) which though Mr. Liſle thinks otherwiſe, is undoubtedly a native of England, as is manifeſt from its ſpontaneous and flouriſhing growth on the top of many mountains, particularly in even the moſt northern parts of Scotland, where no mortal ſurely ever dreamt of cultivating it. The ſpecies called yellow meadow trefoil, or hop clover, is C. Bauhin's *Trifolium pratenſe luteum, capitulo lupuli, vel agrarium*; and the ſmaller kind of this, commonly called noneſuch, or black feed, is the *Trifolium luteum, lupulinum minimum.* M. Duhamel rightly prefers the firſt of theſe ſorts for artificial paſtures and obſerves, that it is the only ſpecies now cultivated in France, for that purpoſe.

Our meadows afford us the white meadow trefoil, honeyſuckle-graſs, or white Dutch clover, which is the *trifolium pratenſe album* of C. Bauhin, and by far the beſt ſort of clover for laſting paſtures, becauſe it is the ſweeteſt and moſt abiding of all plants of this kind. *See* CLOVER.

I do not know that the narrow leaved plantain, or ribwort (*Plantago anguſtifolia*) hath ever been cultivated purpoſely for the food of cattle. It grows, indeed, in almoſt all paſtures: but, as it will thrive upon very dry ſpots, becauſe it ſtrikes a deep root, it may probably deſerve farther trial.

The late Dr. Eliot recommends two ſorts of graſſes, natives of North America, of which he lately ſent over a parcel of the ſeeds to the London Society for the Encouragement of Arts, &c. by whom they have been diſtributed here, ſo that we may hope ſoon to know their ſucceſs in this country, and of which he has given an account in his Eſſays upon Field-Huſbandry in New England. *See the articles* BIRD-GRASS, *and* TIMOTHY-GRASS.

GRASS-*Leaſe*, graſs-lands, or lands appropriated to graſs for feeding of cattle.

GRATTEN, a term uſed in Cornwal, to imply the mowing of graſs, the firſt year after the land has been manured with ſea-ſand; and this operation they call mowing in gratten.

GRAVELLY-*Land*, that which abounds with gravel and ſand. *See the article* SANDY-LAND.

The beſt manure for this ſort of land is marl, or any ſtiff clay that will diſſolve with the froſt, cow-dung, chalk, mud, and half rotten ſtraw from the dunghill.

GREASE, a diſeaſe incident to horſes and other cattle, conſiſting of ſwellings and gourdineſs of the legs.

In order to treat this diſorder with ſome propriety, without having recourſe to the falling down of humours for its explanation, we ſhall conſider it as ariſing from two different cauſes; a fault or relaxation in the veſſels, or a bad diſpoſition of the blood and juices. In order to this, it will be neceſſary to obſerve, that the blood and juices are carried to the extreme parts by the arteries, and returned by the veins; conſequently the blood muſt riſe perpendicularly in the latter, in order to return from the extremities to the heart. And hence ſwellings in the legs of horſes may be eaſily accounted for, as a partial ſtagnation of the blood and juices may be naturally expected where the circulation is languid, eſpecially when there is a want of due exerciſe, and a proper muſcular compreſſion on the veſſels to puſh forward the returning blood, and propel the inert, and half ſtagnating fluids through their veſſels. In ſhort, the blood, in ſuch caſes, cannot ſo eaſily aſcend as deſcend, or a greater quantity will be brought by the arteries than can be returned by the veins.

The greaſe then, conſidered in this light, muſt be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a diſorder where they are both complicated: but when it is an attendant on ſome other diſtemper, as the farcy, yellow dropſy, &c. ſuch diſeaſes muſt firſt be cured before the greaſe can be removed. In the former caſe, moderate exerciſe, proper dreſſing, cleanlineſs, and external applications, will anſwer the purpoſe; in the latter internals muſt be called into our aſſiſtance, with proper evacuations.

When a horſe's heels are firſt obſerved to ſwell in the ſtable, and ſubſide, or go down, on exerciſe, let care be taken to waſh them very clean every time he comes in, with ſoap-ſuds, chamberlye, or vinegar and water, which, with proper rubbing, will frequently prevent or remove this complaint: or let them be well bathed twice a day with old verjuice, or the following mixture, which will brace up the relaxed veſſels; and if rags dipped in the ſame are rolled on, with a proper bandage, for a few days, it is moſt likely the ſwellings will ſoon be removed by this method only, as the bandage will ſupport the veſſels till they have recovered their tone. To anſwer this end alſo, a laced ſtocking, made of ſtrong canvas, or coarſe cloth, neatly fitted to the part, would be found extremely ſerviceable, and might eaſily be contrived by an ingenious mechanic.

Take rectified ſpirit of wine four ounces, diſſolve it in half an ounce of camphor, to which add wine-vinegar, or old verjuice, ſix ounces; white vitriol, diſſolved in a gill of water, one ounce; mix together, and ſhake the phial when uſed.

But if cracks or ſcratches are obſerved, which ooſe and run let the hair be clipped away, as well to prevent a lodgment (which becomes ſtinking and offenſive by its ſtay) as to give room for waſhing out dirt or gravel, which, if ſuffered to remain there, would greatly aggravate the diſorder.

When this is the caſe, or the heels are full of hard ſcabs it is neceſſary to begin the cure with poultices, made either of boiled turnips and lard, with a handful of linſeed powdered, or oat-meal and rye-flour, with a little common turpentine, and hogs lard, boiled up with ſtrong beer grounds, or red wine lees. The digeſtive ointment being applied to the ſores for two or three days, with either of theſe poultices over it, will, by ſoftening them, promote a diſcharge, unload the veſſels, and take down the ſwelling, when they may be dried up with the following:

Take

Take white vitriol and burnt alum, of each two ounces; Ægyptiacum one ounce; lime water a quart, or three pints: waſh the ſores with a ſponge dipped in this, three times a day, and apply the common white ointment, ſpread on tow; to an ounce of which may be added two drams of ſugar of lead.

Or the following waſh and ointment may be uſed for that purpoſe.

Take half an ounce of Roman vitriol, diſſolved in a pint of water; then decant off the clear into a quart bottle, add half a pint of camphorated ſpirits of wine, the ſame quantity of vinegar, and two ounces of Ægyptiacum.

Take honey four ounces, white or red lead, powdered two ounces, verdigreaſe in fine powder one ounce: mix together.

Some, for this purpoſe, apply alum-curd; others a ſtrong ſolution of alum in verjuice, with honey; and many of theſe forms may be eaſily contrived. But let it be remembered, that as ſoon as the ſwelling is abated, and the moiſture leſſened, it would be very proper to keep the legs and paſterns rolled up with a firm bandage, or linen roller, two or three fingers wide, in order to brace up the relaxed veſſels, till they have recovered their natural tone.

This method is generally very ſucceſsful, when the diſtemper is only local, and requires no internal medicines: but if the horſe be full and groſs, his legs greatly gorged, ſo that the hair ſtands up, and is what ſome term penfeathered, and has a large ſtinking diſcharge from deep foul ſores, you may expect to meet with great trouble, as theſe diſorders are very obſtinate to remove, being often occaſioned by a poor dropſical ſtate of the blood, or a general bad diſpoſition in the blood and juices.

The cure in this caſe, if the horſe is full and fleſhy, muſt be begun by bleeding, rowels, and repeated purging; after which diuretic medicines are frequently given with ſucceſs. Thus,

Take four ounces of yellow roſin, one of ſal prunellæ; grind them together with an oiled peſtle, add a dram of oil of amber, and give a quart of forge-water every morning, faſting two hours before and after taking, and ride moderately.

As this drink is found very diſagreeable to ſome horſes, I would recommend the nitre balls in its ſtead, given to the quantity of two ounces a day, for a month or ſix weeks, mixed up with honey, or in his feeds: take the following alſo for that purpoſe.

Yellow roſin four ounces, ſalt of tartar, and ſal prunellæ, of each two ounces; Venice ſoap half a pound; oil of juniper half an ounce; make them into balls of two ounce weight, and give one every morning.

Or,

Take nitre two ounces; camphor one drachm, honey enough to make into a ball; give as the former.

The legs in this caſe ſhould be bathed or fomented, in order to breath out the ſtagnant juices, or to thin them, ſo that they may be able to circulate freely in the common current. For this purpoſe foment twice a day with a diſcutient fomentation, in which a handful or two of wood aſhes has been boiled; apply then the above poultice, or the following, till the ſwelling has ſubſided, when the ſores may be dreſſed with the green ointment till they are properly digeſted, and then dried up with the water and ointment above recommended.

Take honey one pound, turpentine ſix ounces, incorporate with a ſpoon; and add of the meal of fenugreek and linſeed, each four ounces; boil in three quarts of red wine lees, to the conſiſtence of a poultice; to which add, when taken from the fire two ounces of camphor in powder; ſpread it on thick cloths, and apply warm to the legs, ſecuring it on with a ſtrong roller.

If the ſores are very foul, dreſs them with two parts of the wound ointment, and one of Ægyptiacum; and apply the following, ſpread on thick cloths, and rolled on.

Take of black ſoap one pound, honey half a pound, burnt alum four ounces, verdigreaſe powdered, two ounces, wheat flour a ſufficient quantity.

If the diuretic balls ſhould not ſucceed, they muſt be changed for the antimonial and mercurial alteratives, already mentioned; but turning a horſe out in a field, where he has a hovel or ſhed to run to at pleaſure, would greatly contribute to quicken the cure; and, indeed would in general effect it alone: but if this cannot be complied with, let him be turned out in the day time.

If the horſe is not turned out, a large and convenient ſtall is abſolutely neceſſary, with good dreſſing and care: this ſtall ſhould be ſix feet wide, that a tall horſe may ſhoot out his legs at length, ſo that the blood may circulate freely, without meeting with reſiſtance, which it naturally muſt, when a horſe lies all on a heap, or with his hind legs, under him: nor ſhould the ſtable be paved with too great a declivity, for if the horſe ſtands too low with his hind legs, moſt of his weight will reſt upon them; and give him the greaſe, eſpecially if he be at all inclined to be gourdy.

The laſt thing we ſhall recommend, is to make him lie down in the ſtable as often as poſſible. This is undoubtedly of the utmoſt conſequence, as it will not a little contribute to the removal and cure of this diſorder: for by only changing the poſition of his legs, a freer circulation would be obtained, and the ſwelling taken down; whereas it is in general greatly aggravated by the obſtinacy of the horſe, which refuſes to lie down at all, probably from the pain it gives him in bending his legs neceſſary for that purpoſe; by which means the ſtiffneſs and ſwelling increaſes, till the over-gorged and diſtended veſſels are obliged to give way, and, by burſting, diſcharge the fluids that ſhould circulate through them. *Bartlet's Farriery, page* 284.

GREASE melted. *See the article* MOLTEN-GREASE.

GREEN-SCOURING, a diſeaſe to which ſheep and bullocks are often ſubject.

The beſt remedy for this diſorder is verjuice; a wineglaſs full is enough for a ſheep, and a pint for a bullock. *Liſle's Huſbandry, vol.* II. *page* 211.

GRIP,

GRIP, or *Gripe*, a ſmall ditch cut acroſs a meadow or ploughed-field, in order to drain it.. It is otherwiſe called a water-furrow.

GRIPES, a very acute diſeaſe to which horſes are very often ſubject.

There ſeems to be no diſtemper ſo little underſtood by the common farrier, as the gripes or colick in horſes, one general remedy, or method, ſerving them in all caſes but as this diſorder may be produced by very different cauſes, the method of cure muſt alſo vary, otherwiſe the intended remedy, injudiciouſly applied, will not only aggravate the complaint, but make it fatal. We ſhall divide this diſorder into three different ſpecies: the flatulent or windy, the bilious or inflammatory, and the dry gripes; each of which we ſhall diſtinguiſh by their different ſymptoms, and then point out the proper remedies.

The flatulent, or windy colick is thus known. The horſe is often lying down, and as ſuddenly riſing again with a ſpring; he ſtrikes his belly with his hinder-feet, ſtamps with his fore-feet, and refuſes his meat; when the gripes are violent, he will have convulſive twitches, his eyes be turned up, and his limbs ſtretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this laſt ſymptom proceeds from a ſtoppage of urine, that almoſt always attends this ſort of colick, which may be increaſed by a load of dung preſſing on the neck of the bladder.

Theſe are the general ſymptoms of colick and gripes from wind, drinking cold water when hot, and when the perſpirable matter is retained, or thrown on the bowels by catching cold; in all which caſes they are violently diſtended. Cribbing horſes are more particularly ſubject to this complaint, by reaſon they are conſtantly ſucking in great quantities of air.

The firſt intention is to empty the ſtrait gut with a ſmall hand dipt in oil, which frequently makes way for the confined wind to diſcharge itſelf; and by eaſing the neck of the bladder, the ſuppreſſion of urine is taken off, and the horſe ſtales and gets eaſe.

Farriers generally ſtrike a fleam in the bars of a horſe's mouth, which ſeems to be of little or no uſe; for where a quantity of blood is intended to be taken away, the veſſels of this part are neither large or numerous enough to furniſh it; ſo that it is more eligible to take it from the neck-vein, and is always proper in full, ſanguine, plethoric, young horſes.

The following ball and clyſter ſeldom fail of giving relief in theſe caſes:

Take Straſburgh or Venice turpentine, and juniper berries pounded, of each half an ounce; ſal-prunella, or ſalt-petre, an ounce; oil of juniper, one dram; ſalt of tartar, two two drams: make into a ball, with any ſyrup; it may be given whole, and waſhed down with a decoction of juniper-berries, or a horn or two of ale.

If the horſe does not break wind, or ſtale plentifully, he will find no relief; therefore in an hour or two give him another ball, and add to it a dram of ſalt of amber; which may be repeated a third time, if found neceſſary. During the fit the horſe may be walked and trotted gently, but ſhould by no means be harraſſed beyond his ability, or dragged about till he is jaded.

The following clyſter may be given, between the balls, or alone, and repeated occaſionally:

Take chamomile flowers two handfuls; aniſe, coriander and fennel ſeeds, of each an ounce; long pepper half an ounce: boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of chamomile eight ounces.

The ſubſequent balls and drink are alſo very proper for this purpoſe, and to remove gripes occaſioned by drinking cold water when hot, or catching cold after violent exerciſe:

Take powder of aniſe, cumin, and fennel-ſeeds, of each half an ounce; camphor two drams; pellitory of Spain, one dram; oil of juniper fifty drops, make into a ball with any ſyrup, and waſh it down with a horn or two of ale.

Or,

Take mithridate, or Venice treacle, two ounces; Matthew's pill two drams; camphor one dram, diſſolved in a little ſpirit of wine; powder of freſh anniſeed one ounce; or the ſame quantity of the cordial-ball; diſſolve in a pint and half of ale.

Or,

Take philonium one ounce, or an ounce and an half; tincture of ſenna, or Daffy's elixir, and ſallad-oil, of each half a pint: give warm for a drink, and repeat it if neceſſary.

Either of theſe medicines are well calculated for this purpoſe; but as the ingredients may not always be ready at hand, or procurable, we ſhall put down a couple of drinks that have frequently, on trial, been found ſucceſsful, and are eaſily prepared. It is to be obſerved, that the horſe ſhould be well rubbed, clothed, and littered with clean ſtraw up to his belly.

Take of Caſtile-ſoap, or hard-ſoap; nitre or ſalt-petre, of each one ounce: juniper-berries and ginger each half an ounce: Venice turpentine, or roſin, diſſolved with the yolk of an egg, ſix drams: mix with a pint and a half of warm ale, or a decoction of juniper-berries, with a large onion boiled with them. This may be repeated twice or thrice.

Or,

Take a pint of brandy, rum, or geneva, with as much ſweet oil, and give for a drink. Should this not ſucceed, boil an ounce of pepper or ginger, in a quart of milk; and add to it a handful of ſalt, and half a pint of oil: this given warm, will (according to Burdon) purge in two or three hours.

The ſigns of a horſe's recovery, are his lying quiet, without

without ſtarting, or tumbling, and his gathering up his legs, and ceaſing to laſh out; and if he continues an hour in this quiet poſture, you may conclude all danger over.

The next ſpecies of colick we ſhall deſcribe is the bilious or inflammatory, which, beſides moſt of the preceding ſymptoms, is attended with a fever, great heat, panting, and dryneſs of the mouth; the horſe alſo generally throws out a little looſe dung, with a hot ſcalding water, which when it appears blackiſh, or of a reddiſh colour, and fetid ſmell, denotes an approaching mortification.

In this caſe the horſe ſhould immediately be bled to the quantity of three quarts; and it ſhould be repeated if the ſymptoms do not abate in a few hours. The emollient clyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a day, to cool the inflamed bowels; plenty of gum-arabic-water ſhould be taken; and a pint of the following drink given every two or three hours, till ſeveral looſe ſtools are procured; and then it ſhould be given only night and morning, till the diſorder is removed.

Take ſenna three ounces, ſalt of tartar half an ounce; infuſe in a quart of boiling-water an hour or two; then ſtrain off, and add two ounces of lenitive electuary, and four of Glauber ſalts.

If this diſorder is not removed by theſe means, but the inflammation and fever increaſe, attended with a diſcharge of the fleſh-coloured water above deſcribed, the event will moſt probably be fatal; and the chief thing to be depended on now, muſt be a ſtrong decoction of Jeſuits bark, given to the quantity of a pint every three hours, with a gill of red port wine.

A quart of the ſame may be uſed for a clyſter, with two ounces of Venice turpentine, diſſolved with the yolks of two eggs, an ounce of diaſcordium, and a pint of red wine, and given twice a day: if the horſe recovers, give two or three mild rhubarb purges.

To a horſe of little value, give the following, which in theſe caſes, has been found ſucceſsful.

Take diapente one ounce, diaſcordium half an ounce, myrrh, in powder, two drams; make it into a ball with two drams of oil of amber, to be given twice or thrice a day.

The laſt we ſhall deſcribe is the dry gripes, or the colick, which ariſes often from coſtiveneſs: it is diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, aud his great reſtleſſneſs and uneaſineſs.

In this caſe the ſtrait gut ſhould be examined and emptied, with a ſmall hand, oiled properly for that purpoſe; the emollient oily clyſter, given under the article CLYSTER, ſhould be thrown up twice a day; and the above purging drink given, till the bowels are unloaded, and the ſymptoms removed.

The diet for a horſe in the gripes ſhould be ſcalded bran, warm water gruel, or white water, made by diſſolving four ounces of gum-arabic in a quart of water, and mixing it with other water.

From this hiſtory and diviſion of gripes and colicks, with their different treatment, it appears how abſolutely neceſſary it is they ſhould be well underſtood, in order to be managed ſkilfully: it is plain, too, that violent hot medicines ſhould, in every ſpecies of this diſorder, be guarded againſt, and given with great caution and diſcretion, even in the firſt kind of flatulent colick, where indeed they can only be wanted; yet too often, when prepared by the farriers, with oil of turpentine, geneva, pepper, and brine, &c. they even increaſe that diſorder, by ſtimulating the neck of the bladder too forcibly, heating the blood, and inflaming the bowels, till a mortification is brought on them. Theſe are in general the conſtant appearance of horſes that die of this diſorder, whoſe bowels, being examined for that purpoſe, have been found inflamed, full of red and livid ſpots, ſometimes quite black, criſped with extreme heat and rotten.

GRIPS, the ſwaiths, or ſmall heaps of corn, lying in the field, as it is cut down with the ſcythe or ſickle.

GROATS, oats, after the ſhells are taken off.

GROUND, a general name for land, be the ſoil what it will.

The Romans were very attentive to examine the nature of the ground before they broke it up, and diſtinguiſhed it into three ſituations, champaign, hilly, and mountainous. They rightly approved moſt of a champaign country, declining gradually from the foot of a hill toward the ſouth, or ſouth-eaſt; if a hill riſing gently; and if a mountain neither lofty, nor rugged, but covered with plenty of wood and graſs. Either of theſe ſituations is eligible, according to the purpoſe for which the ground is intended; ſome plants affecting hotter, others colder expoſures; ſome delighting to dwell on hills, others in vallies; and ſome again being indifferent to either: but generally ſpeaking, moſt vegetables chooſe the warm and kindly ſoil of low grounds, fertilized by what the rains bring down to them from the hills and more elevated parts.

The ſpontaneous produce of the earth is an infallible indication of the nature and quality of the ground. Wild thyme ſhews it to be good for feeding cattle; betony and ſtraw-berries direct to wood; chamomile points out a mellow ſoil fit for wheat; burnet indicates land fit for paſture; and mallows denote it proper for the uſes of the kitchen-garden, as has been obſerved by lord Bacon, Mr. Evelyn and others.

On the contrary, ſays the laſt mentioned of theſe writers, ſome ground is ſo cold, as naturally to bring forth nothing but gorſe, broom, holly, yew, juniper, ivy, box, &c. which may perhaps direct us to the planting pines, firs, and other perennial verdures in ſuch places.

Moſs, ruſhes, wild tanſy, ſedge, flags, fern, yarrow, and withered, blaſted, ſhrubby, and curled plants, are natural indications of a very bad ſoil.

The nature of the ground may alſo be pretty well gueſſed at, by the quality of the water which runs, or is ſtrained through it.

By the ſmells, which, upon the falling of the firſt rains after a long drought, is very pleaſing, and even fragrant, from good and natural mold; but diſagreeable and noxious, if the ground contains any mineral,

or

or other ill quality, as is remarkable in marſhes and fenny places.

By the taſte, all earths, as well as plants, abounding more or leſs in their peculiar ſalts; ſome ſweet and grateful; others bitter, hot, or aſtringent; and others flat and inſipid; eaſily diſcovered by the method which Columella directs, of digging up ſome of the under mould, out of that part of the land which is deemed the worſt, and mixing it thoroughly in an earthen veſſel, with ſweet water, which, when poured off after the groſſer parts have ſubſided, will retain the taſte of the earth ſoaked in it.

The touch will immediately ſhew whether it be ſoft, pliant, fat, and ſlippery; whether it ſticks to the fingers, or melts and diſſolves on the tongue; in which caſe the ſoil may be deemed rich. If it be gritty, light, and porous, it is bad.

Mould fit for the production of plants is of an uniform ſubſtance, unmixed with the contrarieties of ſoft and hard, churliſh and mild, moiſt and dry: neither is it too unctuous or too lean; but light, and crumbles eaſily; yet is conſiſtent enough to be wrought and kneaded. It is of ſuch due tenacity as to retain a juſt degree of moiſture, and neither ſoils the fingers, nor cleaves much to the ſpade, which eaſily enters it. Of this kind is the ſoil uſually found under the turf of paſture-grounds, upon which cattle have been long fed and foddered. In ſhort, that is the beſt mould which is blackeſt, cuts like butter, ſticks not obſtinately, breaks into ſmall bits, ſmells ſweet, is tempered without cruſting or chopping in dry weather, or becoming poachy in wet, which ſhines after the plough, where flocks of crows follow the ploughman, and, as Pliny expreſſes it, peck at his very heels.

As to colour, next to the blackiſh, the pre-eminence is generally given to the darker gray, and after that to the ruſſet: the clear tawny is reputed worſe; the light and dark aſh-colour (light of weight and reſembling aſhes) good for very little: and the yellowiſh red, the worſt of all.

The common opinion, that all grounds are red or brown; cold and dry, blackiſh; cold and moiſt, whitiſh; hot, and moiſt, ruddy; is, notwithſtanding the ſpecious arguments alledged in favour of it, from the exhalation of minerals, the heat of the ſun, and other accidents, exploded by Columella, who propoſes, as a much ſurer way to judge of the goodneſs of land, digging a trench, and afterwards throwing back the ſame earth that was dug out, treading it down well when it is returned. If, ſays he, through a kind of ferment as it were, there be more than enough to fill the trench, it is a certain ſign that the ſoil is fat: if there be not enough, we may be ſure that it is poor and lean; and if the quantity be juſt ſufficient to fill the whole from whence it was taken, it is of a middling quality.

Mr. Evelyn, after examining the component parts of ſeveral ſorts of ſoils, concludes, that the very fineſt earths and beſt moulds, however to appearance mixed with divers imperfect bodies, may, for aught we know, conſiſt more of ſandy particles, than of any other whatever. Hence he infers, that earth, ſtript of all heterogeneous particles, retains only weight, and an inſipid ſiccity; and doubts whether it affords any thing more than embracement to the firſt rudiment of plants, protection to the roots, and ſtability to the ſtem; being "unprolific till married to ſomething of a more maſculine virtue, which irradiates her womb: but otherwiſe, nouriſhing only from what is added, without any action or material contribution: for, ſays he, what gives the divers tempers to moulds, ſeems rather to be cauſed by the perpetual and ſucceſſive rotting of vegetable and animal ſubſtances, than by any peculiar and ſeparate principle; the clamminess of the earth ſeeming rather ſomething extrinſical and accidental to it, than natural and originally conſtitutive. We know indeed, that the earth is, without any artificial auxiliaries, indued with a wonderful prolific virtue: but as this is liable to be loſt, or do decay, and never can be expected from ſome grounds, without helps, it may be worth our while to conſider by what expedients the deſired effects of perpetuating its vigour may beſt be accompliſhed.

The means of giving and perpetuating this vigour now becomes properly the ſubject of our farther enquiry, conſiſtent with what was obſerved before, that in order to the earth's having this vigour, it ſhould be conſtantly kept in an alkaline or calcarious ſtate. Mr. Evelyn is clearly of this opinion, when he ſays, "I firmly believe that were ſalt-petre to be obtained in plenty, we ſhould need but little other compoſt to meliorate our ground." In other words, could the earth be always kept in a ſtate fit for collecting nitre, it would conſequently be always in a ſtate fit for the production of plants. They who are acquainted with chemical reſearches, know, that nitre is obtained from ſubſtances of a mixed nature. Its baſis is a calcarious earth, to which muſt be added putrid or alkaline ſubſtances, eſpecially of the vegetable kind.

Mr. Evelyn and ſome later writers have ſpoken ſo much of the effects of nitre, and nitrous earths, in vegetation, that many have imagined nitre to be eſſentially neceſſary in the growth of plants: though Dr. Woodward aſſures us, that, by all the trials he has been able to make, the very contrary ſeems to be the caſe; for that nitre, when contiguous to a plant, rather deſtroys than nouriſhes it. When, therefore, they mention nitre, and nitrous earths, it is more than probable that they mean earth in a ſtate fit for collecting nitre: but when the alkaline ſubſtances are once ſaturated by the acid in the air, or when the alkali is brought to a neutral ſalt, as nitre is, its fertile ſtate then ceaſes, and it becomes a hard compact body, much more impervious to the roots of plants than it was before.

The nature of calcarious ſubſtances, and that of the two kinds of alkali, viz. the fixed alkaline ſalt of plants, and the volatile alkali ariſing from animal and putrid vegetable ſubſtances, has already been explained.

Farmers commonly ſay, that lime (to which might be added all other calcarious ſubſtances) does not fatten, but only mellows the earth; meaning, according to Dr. Woodward, that it does not contain in itſelf any thing of the ſame nature with the vegetable mould, or, in other words, afford any matter fit for the formation of plants; but that it only ſoftens and relaxes the earth; by that means rendering it more capable of entering into, and of nourithing the ſeeds and vegetables ſet in it, than it would otherwiſe be. It is well known how apt lime is to be put into a ferment and commotion by water. Now this commotion can never happen when the lime is mixed with earth (and it retains its qualities of lime) however hard and clodded the ground may be, without opening and looſening it. What Dr. Woodward ſays of ſalt in general, may more properly be applied to the fixed alkaline ſalt of plants. Every one, ſays he, muſt have obſerved, how apt all ſorts of ſalts are to be wrought upon by moiſture, and

and how eaſily they melt and run with it. When this happens to thoſe that are in the earth, the clods which they are mixed with, moulder and fall aſunder. The ſame gentleman farther obſerves, that if we would render the earth truly fruitful, it muſt be by the addition of ſuch ſubſtances as former crops have robbed it of, or ſuch as contains in itſelf vegetable matter.

The ſeveral manures which are found beſt to promote this end, are chiefly, either parts of vegetables, or of animals; of animals, ſays the doctor, which either derive their own nouriſhment immediately from vegetables, or from other animals that do ſo, and which, being returned to the earth, ſerve for the formation of other ſimilar bodies. Theſe vegetable and animal ſubſtances, are the matter from whence Mr. Evelyn thinks the earth derives that clamminеſs which he takes to be a ſure indication of a rich ſoil.

If the effects of the putrefaction of vegetable or animal ſubſtances, when mixed with, and ſeparated in the earth, be duly attended to, we ſhall find this a very probable opinion. Vegetables, or animals, if expoſed to the air, ſoon putrify and fly off into the air: but when they are divided into ſmall portions, and mixed with the earth, the earth renders the progreſs of their putrefaction ſlower, and intangles the volatile alkaline particles, which would otherwiſe fly off into the air. Theſe are not only ſtrongly attractive of moiſture, but, like the fixed alkali, attract the acid in the air, and effervеſce with it; whence the double advantage of a moiſt and looſe ſoil.

If we attend to the infinite number of animals and vegetables which are rendered volatile by putrefaction, and fly off into the air; and to the quantity of perſpirable matter from animals and vegetables ſent into the air; and alſo to the effects of the acid found every where in the air on ſuch ſubſtances mixed with the earth; we need no longer wonder at the efficacy which writers, in all ages, have aſcribed to the air, with regard to its quality of enriching the earth.

That the peculiar richneſs of ſoils is owing to the putrid or rotten particles mixed with them, is an opinion of long ſtanding. This is Virgil's *putre ſolem*, rotten, crumbling, or looſe earth; and that which Columella diſtinguiſhes by the appellation of *pinguis et putris*, fat and rotten, or fat, looſe, and crumbling, as the ſoil which yields the greateſt profit with the leaſt labour and expence, becauſe it is naturally neareſt that ſtate which cultivation is intended to effect; "for to cultivate is no other thing but to open, looſen, and ferment the earth."

From theſe principles it is that we account for the appearances before-mentioned of good ſoils, ſuch as, their blackiſh or dark colour (which is that of all ſoils in a putrid ſtate) their ready crumbling, eaſy mouldering, fragrance of ſmell, &c.

Mr. Evelyn conſtantly imputes the fruitfulneſs of the earth to a nitrous ſalt: but if theſe rich putrid ſubſtances are ſubſtituted inſtead of that ſalt (and it ſeems highly probable that he means them) we ſhall find that his reaſoning will appear full as ſtrong, more intelligible, and indeed more rational. The ſubſtance of *p.* 312, and 313, of his Philoſophical Diſcourſe of earth, ſo far as relates to this matter, will run thus:

"It is this putrid quality which entices roots to effect the ſurface of the earth, upon which the fertiliſing rains and dews deſcend; which makes all covered and long ſhaded earth, abound in fertility; which reſuſcitates the dead and mortified earth, when languiſhing and ſpent by our indulgence to her verdant offſpring; her vigour being quite exhauſted, till the rains and ſhowers gently melt into her boſom what we adminiſter to ſupply that which has been conſumed. It is this which fertiliſes and renders Egypt ſo luxuriantly fruitful after the inundations of the Nile, &c."

GROUND-IVY, the name of a trailing plant, which ſtrikes out roots from the joints of its ſtalks: but as it generally grows under hedges, and upon the ſides of banks, it cannot be of any great diſadvantage to the ſoil.

GRUB, the name of a large maggot, produced from the eggs of a certain ſpecies of butterfly. It is of a large ſize, and often does great injury to the corn by undermining it, and preying on its roots. It produces the beetle, and is by ſome called the rook-worm, becauſe rooks are particularly fond of it. The beſt way of deſtroying the grub, is good and frequent ploughings, which will clear the ground however infeſted with this inſect, for ſome years at leaſt.

GRUBBING, the clearing of lands from the roots and ſtumps of trees, buſhes, &c.

Mr. Worlidge rightly obſerves, that the beſt and cheapeſt method of grubbing up thorny ſhrubs, broom, graſs, &c. is ingeniouſly delivered by Gabriel Platt. The inſtrument he has recommended for this purpoſe reſembles a three grained dung-fork, but much larger and ſtronger, according to the bigneſs of the ſhrub, &c. the ſtale thereof reſembling a large and ſtrong lever. This inſtrument being placed about half a foot, or any other reaſonable diſtance from the root of the ſhrubs, &c. and driven to a good depth, with a ſtrong hedging beetle, then raiſed by laying under it a ſtone or log of wood, is pulled down by means of a rope faſtened to the upper end of the ſtale, and the whole buſh wrenched up by the roots.

GUTTERING-*Plough*, a ſmall and ſimple inſtrument uſed in ſome counties for draining wet lands.

It is ſmall, and worked by a ſingle man. A trench four or five inches broad, and ſix or eight deep, may be eaſily made with it; and on that account it is much uſed for making drains in bleaching grounds, and may do very well for wet clay meadow-land, where the ſoil is ſhallow, and apt to produce a large quantity of ruſhes.

It conſiſts of a piece of iron about five inches broad and pointed at the end. Upon this piece two other pieces are fixed perpendicular to the former, one on each ſide, the fore-edges inclining backward; ſo that the three edges of the inſtrument form a capital A. To the bottom plate is fixed a ſocket, for receiving the ſtale, which is ſet higher or lower by means of a wedge on the under-ſide. At the end of the ſtale is a croſs piece three feet long, againſt which the man's breaſt is placed when he ſhoves the inſtrument before him, in order to cut the drain. A rib twenty-four inches long is fixed on the ſocket, and at the end of it a peg about a foot long, and two inches diameter is faſtened to the ſide of the ſtale with ſcrews. This peg reſteth on the land, when the clod is turned out of the mouth of the inſtrument.

H.

HACK, a pick-axe, or mattock, having only one, and that a broad end.

HARE, a miſt.

HARROW, an inſtrument for breaking the clods of earth, and covering the corn when ſown. It is a ſort of wooden drag, made in the form of a ſquare, with large iron-teeth or tines. The reader will find different ſorts of harrows deſcribed under the articles BEANS, LUCERNE, &c.

HART-CLOVER, melilot.

HARVEST, the ſeaſon when the corn is ripe, cut down, and carried into barns, &c.

Wheat which is full of weeds ought to be cut three or four days ſooner than ordinary, that the weeds may have time to wither before the corn become too ripe: for if it be not cut till the grains are full ripe, it will be liable to conſiderable damage by ſhedding, loſs of colour, and injuries from rain, whilſt it remains expoſed for the weeds to dry. A ſingle ſhower, indeed, or even a day's gentle rain, whilſt it lies in ſwarth, is thought to be rather beneficial to the grain, by making it feel dry and ſlippery, and threſh the better: but all poſſible care ſhould be taken to guard againſt its being wetted too much. When, through any unavoidable accident, it is laid up not thoroughly dry, though it will not take much harm in the mow, it will ſweat and cling together when laid in a heap after being threſhed, and look as white, with mouldineſs, as if it had been ſtrewed with flour. Such corn will not keep, and therefore ſhould be ſent to market, and ſold, as ſoon as it is threſhed.

In Oxfordſhire, and ſeveral other countries, they bind up their wheat in ſheaves, though it be full of weeds, and ſet three ſheaves ſomewhat ſloping againſt three others, after which they cover their tops with two ſheaves opened at their ear-ends, which are extended and placed downward. In this ſituation they let their wheat ſtand three weeks or a month in the field, before they carry it in: for no wet can hurt it, nor is it apt to grow in the ear, when thus ſheltered.

In their wheat-pooks, as they call them, in Wiltſhire, the ſheaves are ſet in a circle, with their ears uppermoſt, another circle of ſheaves is placed upon that, and ſo on, contracting each round, till the pile ends in a point, upon which a ſheaf opened, and turned with the ears downward, is placed, like the hackle of a hive; for an ear turned downward will not grow, though ever ſo much wet fall upon it, and the bottom of a ſheaf being broader than its top, every upper one ſhelves over the under, like the eaves of a houſe. A load, or two loads, may be thus put into a pook, which is a very good way to ſecure corn againſt rain, and to give the weeds among it time to dry. But, as Mr. Liſle rightly judges, this method is not altogether proper when the wheat is intended to be laid up in a rick; becauſe, if the weather prove wet, mice will run to it for ſhelter, and will be carried in with the pooks. It is the general way of making wheat-ricks in the iſle of Wight, without thatching.

Though moſt corn is bettered by lying awhile in ſwarth, or grips, to take the dews, which contribute to render its grain plump and of a good colour; yet its ſtraw becomes thereby the worſe for fodder, unleſs it was cut before it had attained full maturity, and lies out no longer than till it be ſufficiently ripened.

In hot dry ſummers, when the corn ripens fully, and its own vigour gives it a proper colour, and plumps up the grain ſo that the huſks readily yields their contents when threſhed, wheat need not lie out in grip, before it is ſheaved, or in ſheaf; unleſs it be very full of graſs and weeds: but in cold ſummers, the wheat is horny and pale, the grains are thin and require being plumped, and their huſks cling ſo cloſe, that they muſt be mellowed, in order to make them threſh well. The full grain which ſwells the chaff, even till it opens, in good and fruitful years, lies almoſt bare to every moiſture; and the heavy ears then ſpread and hang over the ſheaf, which of courſe opens wider, and lets the rain into the bands ſooner than in leſs kindly ſeaſons, when, the wheat being light, the ears in the ſhock ſtand more upright and cloſer together.

In proportion to the heat of the weather, greater expedition is neceſſary in reaping; for corn, when haſtily ripened, ſcorched up by the ſun, and full in grain, ſoon takes a ſtain, is damaged by wet, and eaſily ſheds at every blaſt of wind. The prudent huſbandman ſhould therefore, in ſuch caſes, employ the greater number of reapers; for he cannot deſire more, than that his corn be perfectly ripe, and of a good colour; for which reaſon, the leſs it then lies abroad in grip or ſheaf, the better it will be. Cutting it high up, ſo as to avoid the intermixed graſs as much as poſſible, by which means it is the ſooner fit for carting, has been found very ſerviceable on theſe occaſions; and Mr. Liſle is of opinion that, eſpecially in hilly countries, corn can never be better houſed, if thorough ripe, hard, and not weedy, than by gripping and carting as faſt as it is cut down; becauſe the dampneſs which it takes by lying on the ground all night, is not eaſily removed.

It is always moſt adviſable to turn the grips of wheat which is left out, very early after their being cut down, in order to get them dry as ſoon as poſſible. By this means they are kept the longer from ſprouting in the ear, in caſe of rain: for if dripping weather or driving miſt ſhould enſue, and continue for any time, after they have been already

already loaded with wet, all the art of man cannot prevent their growing: nay, even independant of other accidents, the bare weight of the ears will ſink the grips of wheat to the ground, though they have been laid ever ſo light and hollow; and they will certainly be injured thereby, if ſuffered to lie long out in wet weather. The beſt method of guarding againſt this, is by laying them in triangles, as directed by M. de Liſle.

A principle ſomewhat ſimilar to this ſeems to be the reaſon why the farmers in Leiceſterſhire, and Northamptonſhire, in particular, where the land is rich, deep, lies flat, and is much incloſed, leave a very high wheat ſtubble, upon which the grips are ſupported, lie the hollower from the ground, and conſequently are the eaſier dried by the ſun and wind; for it is to be obſerved, that the fatter and richer the ſoil is, the ſooner the grips will grow after they have taken wet, if they lie upon the naked ground; much ſooner than they would, in the ſame caſe, in a hilly country where the land is poor. Huſbandmen there beſides eſteeming it an advantage that they can ſtow a greater number of ſhort-cut ſheaves in their barns, think the loſs of the ſtraw compenſated by the excellent thatch which they make of the ſtubble. In ſome places they mow it for drying malt.

The forwarder the haveſt is, and the warmer the ſeaſon, the longer the corn may ſafely lay in the field, either in grips, or ſheaves: for this expoſure to the air, after it is cut down, mellows it, and makes it threſh better and look finer. Thus, when the wheat harveſt takes place by the middle, or at leaſt before the latter end of July, of which we have had inſtances, there can be little danger in letting the wheat lye abroad four or five days or a week, if it be not over ripe when cut, even though a rainy day or two ſhould come: for at that time of the year the ſun is ſo hot, the days are ſo long, the graſs ſo ſhort, and the dews generally ſo little, that the corn ſoon dries, even after a hard ſhower; whereas in the middle, and ſtill more towards the latter end of Auguſt, the rainy ſeaſon frequently begins, the dewy nights grow ſo long, the graſs is ſo rough, and the ſun's drying power ſo much abated, that, if wet weather comes on then, the corn will be much more apt to grow.

A caution which Mr. Liſle recommends as ſingularly important in hilly countries, is not to bind the grips of wheat up into ſheaves too early in the day; becauſe, in ſuch a ſituation, the grips take ſo great a damp by having laid on the ground, that, though the ſtraw, and chaffy ears may ſeem to be dry when the dew is firſt gone off, and after the ſun may have ſhone an hour or two upon them, yet there will remain an inward dampneſs in the corn, and within the ſtraw, which, if laid up in that condition, will come damp from the rick or barn at threſhing time. The afternoon is therefore certainly beſt for gripping and binding into ſheaves in ſuch countries, but ſo that this work may be finiſhed before the day is over. The bands ſhould, however, be laid in the morning, that they may not crack; for the ſtraw will not twiſt after the ſun is up, but will be brittle, and break off below the ears. The turning of three or four of the ſtubble or bottom ends of the ſtraw to the ears of the band, helps greatly to add to its ſtrength and toughneſs.

The bands for binding up the ſheaves ſhould not be ſpread but in fair weather, becauſe, being preſſed down by the grip or two which it is neceſſary to lay upon them to keep them in their places and prevent their being untwiſted by the ſun, they will grow ſooner than any other corn, if rain ſhould come; for they cannot dry, on account of their lying undermoſt. But though the bands muſt always be made while the morning dew is upon them, the ſheaves ought not by any means to be bound up wet, if they are they will certainly grow mouldy.

Farmers do not alway attend ſufficiently to the binding up of their ſheaves, but ſuffer the reapers, for diſpatch, to tie the bands juſt underneath the ears, inſtead of binding them at the other end; the conſequence of which is, that they will hardly hold together to be flung into the cart at harveſt, and will certainly be in great danger of falling to pieces before they are threſhed.

If a little rain is foreſeen in harveſt time, it is beſt to bind the grips up into ſheaves as faſt as they are made; becauſe ſmall ſhowers will wet the ſingle grips ſo much that they cannot be bound up, and thoſe ſhowers may be the fore-runners of greater rains. The ſheaves, being bound, will ſoon dry after ſuch wet. But if a hard rain is foreſeen, the beſt way is not to bind up into ſheaves, becauſe they will then be wet to the bands, and muſt all be opened again. One of Mr. Liſle's neighbours, to whom this happened, unſheafed ſome of his wheat to dry it, opened it, and turned it ſo often, that the ears broke off, by which he loſt half his corn. Caution ought therefore to be uſed in this caſe, leſt by curing one evil we create a worſe.

All farmers agree that rain which comes with a driving wind, is the worſt of any weather for ſheaves of wheat out in the fields; and that it is worſe than a downright ſoaking rain for ſuch ſheaves as are wet to the bands.

In a wet harveſt, ſmall ſheaves are beſt, becauſe, thin at top, and falling cloſe, the rain does not ſink down into the middle of them, and ſo go through into the bands, as it is apt to do in great ſheaves, which lie broader, and take a larger compaſs. Small ſheaves are alſo beſt, when many weeds are intermixed with the corn, becauſe the air, wind, and ſun, have then a greater power to dry them, than they could have if the ſheaves were large.

It has been the opinion of ſome good farmers, that if the weather be likely to continue fair, it is beſt to lay the ſheaves, the night after the wheat is cut, one by one, flat on the ground, in order to make the ſtraw lie the cloſer together, and their ears ſtand the ſtiffer, and more upright, by which means they will be leſs apt to open at the top, and rain will have the leſs power to penetrate them when laid in ſhocks.

Reapers ſhould take care in placing their grips, to lay the ſtraw end in the furrow, and the ears out, becauſe theſe will then ſtand ſloping up, and lie tolerably dry, even though rain ſhould come; but in the other way they would ſoon grow.

Mr. Liſle remarks, in his Obſervations (which might have been thrown into a more regular, as well as more laconic form, before they were publiſhed; for that gentleman certainly never intended, that his unconnected notes and memorandums ſhould appear in the manner in which he penned them merely for his own uſe) that "one of his reapers, when he had made up ſome wheat into ſheaves, the wheat being long-eared and lop-heavy, ſaid, rain had not need meet with thoſe ſheaves before they were carried home." Mr. Liſle aſked him, "Why ſo?" To which the other replied, "becauſe the ears being long and heavy, were buſsle-headed, that is, did

hang their heads downward into the ſheaf, ſo that (in caſe a rain ſhould run down to the bands) neither ſun nor wind could enter in to dry them; whereas, ſaid he, when the ears are ſhort, and not heavy, they ſtand upright and hollow, ſo that the ſun and air may eaſily dry them."

The ſtraw of blighted wheat, being hollow and ſpungey, is very apt to imbibe moiſture; for which reaſon the beſt way is to houſe ſuch corn as ſoon as it is tolerably dry, eſpecially if there be the leaſt proſpect of rain; for if ſtraw of that looſe texture ſhould once ſoak in wet, and ſhowery weather ſhould afterward come on, it would require much more time than other corn to dry and fit it for threſhing.

Experience has ſhewn, that wheat keeps better when ſtacked in the ear unthreſhed, than its grain does alone, when threſhed out and laid up in granaries: beſides which, a farther advantage which attends the ſtacking of this corn is, that the huſbandman need not threſh it, but as his markets or other occaſion require; whereas, if it were to remain long in the barn, he would not be able to preſerve it from rats, mice, and other vermin, which harbour in the walls, roofs, &c. of ſuch buildings.

To guard againſt theſe enemies, as well as againſt the dampneſs of the ground, which would otherwiſe occaſion great loſs (for there have been inſtances of its rotting piles of corn to the thickneſs of a yard, or more) four, ſix, or more ſtrong poſts, according to the intended ſize of the ſtack, are driven into the ground, beams of a proper ſtrength are laid acroſs them, and upon theſe is made a floor to ſupport the ſtack. Some farmers build theſe platforms for their ſtacks ſo high from the ground that there is room to ſhelter their carts and other implements of huſbandry under them: and ſome again, as an additional ſecurity againſt rain and birds, erect ſides and a roof, by which means they form a kind of barn: but this is needleſs, if the corn be ſtacked, as it ought to be, in ſheaves, with the ears turned inward, and the ſtraw ends outward, and the top well thatched with good wheat ſtraw, which is the beſt of any ſort for thatching. They likewiſe cover the ſupporting poſts with tin, for about a foot in breadth from the top, to prevent the mice and rats getting up: but this method ſoon proves ineffectual, becauſe tin is very apt to ruſt, and conſequently loſes its ſmoothneſs. A better, way, as Mr. Mortimer adviſes, is to cover thoſe poſts with Dutch tiles, ſuch as chimnies are commonly ſet with, becauſe they will always keep ſmooth. Others make their ſupporters of two hewn ſtones, one of which, being about three feet high, and ſloped from the bottom, where it is two feet wide, to the top, where it is but a foot thick, ſtands upright, and is covered with a large flat ſtone, about a yard ſquare, or which is better, of a round form. This not only prevents rats and mice from climbing up, but is alſo a ſecurity againſt the dampneſs of the ground. Others again, whoſe mothod is the beſt of all, lay a foundation of brick as wide as the ſtack is intended to be, and build round it a brick wall, about two feet high, capped with hewn ſtones, which project ſufficiently outward, to hinder the aſcent of any ſort of vermin. If either rats or mice ſhould, by the help of any thing accidentally reſted againſt the ſtack, chance to climb up, and get into the corn, they will not be able to remain there long, becauſe, as they cannot live without water, neceſſity will force them down, and their former means of climbing being removed, they cannot get up again. If any of them chance then to be left in the ſtack, they will ſoon die there for want of drink.

Particular care ſhould be taken in the ſtacking of wheat, always to lay the ear ends of the ſheaves inward, and upon a riſe, ſo as to keep the middle of the ſtack full while it is worked up: for in this caſe, when it ſettles, the ſinking will be chiefly on the outſide, which will thereby be made to lie the cloſer, and the ſtraw ends being outward, and inclining downward, birds cannot get at the grain, nor can rain be driven up to the ears. The ſhorteſt and thinneſt ſheaves ſhould be uſed in the topping of the ſtack, becauſe it cannot be ſo conveniently drawn in and narrowed with great long ſheaves. They ſhould be taken from off the ſame ground, if the huſbandman wants to keep any particular ſort or growth of corn pure and unmixed. Where leſs nicety is obſerved, oats, or ſome other kind of coarſe grain, are frequently laid on the top of the ſtack of wheat under the thatch, the better to preſerve it from being wet. Wheat, properly ſtacked, will keep in perfect order for many years.

Mr. Liſle, who does not approve of ſtacking any corn but wheat, when room can be found for it in the barn, thatched a long rick of vetches, brought up ſharp, with barley ſtraw, to the thickneſs of three feet, and yet found, upon cutting it, that the rain had penetrated through this thick covering, and done conſiderable damage to the vetches. He imputes this, firſt, to barley-ſtraw's being more woolly and ſpungy than wheat ſtraw, which is cloſe and hard; and, ſecondly, to the ſtack's having ſweated and heated pretty much, in which caſe the covering of ſtraw is always hollowed and ſoftened, and conſequently rendered the more apt to admit and retain wet.

The ſtalks of oats are naturally ſo ſmooth and ſlippery, that they are apt to ſlide in the ſtack, which then frequently tumbles down, eſpecially if this corn was very dry when carried in. An oat rick muſt therefore not be widened by any means beyond its foundation, which generally is of faggots, nor ſhould its ſides ever bulge out, but, on the contrary, they ſhould be gradually contracted. Barley, having a rough ſtem, may be piled more upright.

When ſparrows rooſt at night in holes, under the eaves of a ſtack of corn, it is reckoned a ſure ſign that there are neither rats nor mice in the rick; for their ſqueaking and running about in the night, would diſturb the birds, ſo that they would not ſtay there.

HASK, a huſky cough.

HATTOCK, a ſtock of corn, conſiſting of twelve ſheaves.

In ſome countries it implies only three ſheaves laid together.

HAVER, a name given to oats in ſome parts of England.

HAW, a cloſe, or ſmall field.

HAW, is alſo the common name for the fruit of the white thorn.

HAW, likewiſe ſignifies a ſwelling of a ſpongy texture, growing in the inner corner of the eye of a horſe, and ſometimes ſo large, as to cover a part of the eye.

HAY, a general name for any kind of graſs, cut and dried for the food of cattle.

When

When graſs is to be made into hay, the farmer will be directed in the ſeaſon for mowing it, by the quality of the graſs. When the crops is very great, it ſhould be cut as ſoon as the bottom of the graſs grows yellow: for if it ſtands longer, more will be loſt by the quantity of leaves rotted at the bottom, and the ill flavour which theſe will give to the reſt, than will be gained by its growth. When other circumſtances permit the choice of time, it ſhould be when the graſs is in full bloom, before the ſtalks begin to harden, and rather early than late, becauſe the more ſap remains in the roots, the ſooner the next crop will ſpring up. There is not, however, any general rule for this; becauſe, in ſome caſes, the ripe ſeeds add a great value to the hay, as in ſaintfoin and burnet; and, in others, the growth of the graſs itſelf brings a recompence, as in the fowl-meadow graſs.

A dewy or duſky morning ſhould be choſen for cutting the graſs, becauſe, being then fulleſt of ſap, it ſtands beſt to the ſcythe. When the high noon-tide ſun has dried the graſs, and made it recline its head, the mower will employ his time more uſefully in making the hay already cut, than in continuing to mow, with great additional labour, graſs, which no longer makes the due reſiſtance.

Our farmers in general are very inattentive to the management of their hay whilſt in the cock, to which is in a great meaſure owing the loſs which they (or rather the nation) ſuſtain every year, by the damage which the hay receives from rain.

To guard as much as poſſible againſt this accident, let the hay-makers follow the mowers, and, if the weather be quite fine, ſpread out the graſs as faſt as it is cut down, eſpecially if it lie ſo thick in the ſwarth, that neither the air nor ſun can paſs freely through it: but if wet be feared, let it remain in the ſwarth. At night, make it into graſs cocks, and the next day, as ſoon as the dew is off the ground, ſpread it again, and turn it, that it may wither on the other ſide; then handle it, and if you find it dry, make it up into large cocks. If the weather continue favourable during the ſecond day, the graſs will, by that time, be ſo dry as to bear being kept in theſe cocks till the day on which it is to be carted, when it ſhould be ſpread out again in the morning, to receive a farther drying, if wanted. If theſe cocks are made as tall and as taper as can be, conſiſting with their ſtanding ſafely, the winds, by paſſing through them, will dry them gently and equally; and though rain ſhould fall upon them, it will not do much hurt, becauſe the greateſt part of it will run off directly, and the ſun and wind will ſoon dry that which may have penetrated into the cocks. Theſe cocks have therefore a great advantage over the common ſmall and low ones: for if a rainy ſeaſon comes on, theſe laſt will be ſo thoroughly wetted, that the wind will not be able to pierce ſufficiently to dry them. More hay is, perhaps, loſt for want of making the cocks properly, than by all the rains which happen in the hay-making ſeaſon.

Where the colour of hay is principally regarded, as in London, the beſt way of making it, provided the the weather be fair, is to open it perfectly and ſpread it thin, immediately after it is cut, and to have hands ſufficient to turn and ſhake it, till the evening, when it is made up in graſs cocks; and thus proceed every day till it is ſufficiently made. In this way the hay retains a fine green colour, and gives it a value with the buyers of hay for horſes; and for this reaſon the hay made about Hendon in Middleſex, and which is made in this manner, gives it a value in London, though in other reſpects not ſuperior to the hay from ſome other places.

Such hay, however, is not more nouriſhing to cattle, than other hay of equal quality, made in a different manner. Some are apt to blame the farmers, for negligence or ignorance in the management of their hay; but it is a matter of greater difficulty than they ſeem to be aware of. In catching ſeaſons, it requires much attention and induſtry to ſave hay, and after all is liable to be ſpoiled, or greately damaged to the owners great loſs, notwithſtanding his utmoſt cure and anxious attendance upon it; and in fine weather, by a ſudden change, he may ſuffer as great loſs, as in a catching ſeaſon. I had once a large field of hay, in fine order, and ſet up in hay cocks; the weather then altered to rain, attended with ſuch a high wind, that the hay cocks were blown down, and ſome of them carried above twenty yards from the places where they ſtood; ſo that the field was covered with the hay, and the weather continuing ſhowery, the hay could neither be dried, nor put up again as before. It was therefore raked together, and made into very ſmall cocks, which could be readily turned with prongs; this was done ſeveral times when the rain abated, and was ſometimes neceſſary to be done, even in the rain to prevent its fermenting: this hay was at laſt ſaved at a great expence in tolerable order, though much damaged; and is mentioned here as a good method of ſaving hay in general, to put it into theſe very ſmall cocks ſoon after it is mowed, not to be ſpread at all, if the weather is the leaſt ſuſpicious; and by opening the cocks ſometimes when the weather is fair and frequently turning them, the hay may be well made: though it is well known to all experienced huſbandmen, that ſaving hay in good order, is often a buſineſs of much difficulty, and attended with no ſmall expence and trouble.

The method here recommended is confirmed by the experience of a New England huſbandman, whoſe account of it to the reverend Dr. Elliot run thus:

"I ſhall relate to you my own practice in making of hay, though it may ſeem ſmall and trifling at the firſt mentioning: but finding that it ſaves me near two fifths of the time and labour I uſed to be at in this article, and that my hay is, I think, better than when I uſed to purſue the uſual method, I eſteem myſelf juſtified in communicating it to the public. My method is this: I mow my graſs, and let it lie in the ſwarth till the dew is off the next morning: then I turn and ſpread my hay, and let it lie in the ſun till the after part of the day, when I take it up and cock it well, and never meddle more with it, till I cart it into my barn, or ſtack it. If the weather be good, it will do well to cart after it has ſtood two days in cock. This, I have found by five or ſix years conſtant experience, anſwers for any ſort of hay, except ſalt-hay and red clover, of which laſt I have not had ſo long trial; but with reſpect to clover hay, I managed it laſt ſummer after this manner, viz. I followed my mowers, as they cut the graſs, I ſpread it as thin as I could, and before night I put it in cock. The next day, after the dew was off, I ſpread it again; in the afternoon, I cocked it a ſecond time, and meddled no more with it till I carried it. The appearance of the hay ſince, makes me judge that no man has better of the ſort. My firſt coming into this practice was purely accidental. After

cutting

cutting my graſs, five or ſix years ago, I put it in cock the next day: but my avocations then were ſuch, that I had no time in which I could poſſibly take any farther care of my hay for many days. When I had diſpatched my other affairs, I returned to it, and found it in as good order (that is to ſay the bulk of it) as ever I had hay in my life. Reflecting then, how much labour may be ſaved by this method, I have followed the ſame practice ever ſince, and find it anſwer very well. The reaſon why I think my hay really better is, becauſe I take it for granted, that the more juice or natural moiſture we can retain in it, without corrupting and rotting the ſtalk, the richer and more nouriſhing it is. The too often turning and ſpreading of hay in the ſun extracts too much of the richneſs thereof; and one day's thus lying will take away ſuch a quantity of the moſt watery particles, as that the remainder is only ſufficient to raiſe a proper fermentation thereof when in the cock, while the ſmallneſs of the body there keeps that fermentation from riſing to ſuch a height as to corrupt it. After twenty-four hours, the fermentation will gradually abate: and the pitching of the hay into the cart, and afterwards into the mow, or ſtack, ſo checks it, that it will not again riſe to ſuch a height as to be detrimental. Cattle are fonder of this hay, than of that which is made in the common way, and leſs of it will ſupport them."

It would be almoſt needleſs to obſerve, that no narrow wheels ſhould ever be brought upon paſtures, not even in the drieſt ſeaſon of the year, as that of hay-making generally is. The advantages of broad wheels, which help to roll and level the ground, and render the draught much eaſier, whether on graſs, or any other ſoil in which narrow wheels will ſink, have been confirmed by experience; and are as ſelf-evident, as it is that the latter cruſh and bury, and thereby deſtroy great numbers of the plants of graſs, wherever they are dragged.

If the hay has ſweated a little in the cock, there will be the leſs need for its ſweating afterwards in the rick, where it will then lie ſo much the cloſer, and conſequently keep the better.

For the method of making lucerne and ſaintfoin, *ſee the articles* LUCERNE *and* SAINTFOIN.

HAY-BOTE, a liberty which a tenant for life, or a term of years, has of taking buſhes, wood, &c. for repairing fences, gates, and the like. It alſo ſignifies the liberty of cutting wood, for making rakes and forks uſed in making hay.

HAYN, or *Hayn-up*, implies the action of incloſing with a hedge, in order to preſerve graſs-grounds from cattle.

HAZLE-*Mould*, a moderately compact earth, containing a large quantity of reſin-coloured ſand.

HEAD-LAND, the land running acroſs the others at the head of the field, left for the turning of the plough.

HECK, a door; alſo a rack for cattle to feed at.

HECKLE, an inſtrument uſed in the dreſſing of flax and hemp. *See the articles* FLAX *and* HEMP.

HEDGE. *See* FENCE.

HEIRS, young trees in coppices.

HEE-GRASS, ſtubble of graſs.

HELM, a hovel; alſo ſtraw prepared for thatching.

HEMP, the name of a plant too well known to need any deſcription here; but it may not be improper to remark, that the flowers and the fruit (commonly called ſeeds) of hemp always grow ſeparately on different ſtems, and conſequently on different plants, as this never has more than one ſtem proceeding from the root.

The flower-bearing ſpecies, which is the *Cannabis floriſera*, Off. *Cannabis erratica*, C. B. P. *Cannabis fœmina*, J. B. *Cannabis ſterilis*, Dod. Pempt. and which is moſt frequently termed female hemp, ſhould properly be called barren hemp, flowering hemp, or male hemp, ſince it is this which bears the *farina fecundans*, or fecundating duſt, without being impregnated with which the ſeeds that grow on the other ſtems of the other ſpecies would not come to maturity, or at leaſt would not be capable of producing plants, when ſown.

This other ſpecies, which bears the ſeeds, and which botaniſts diſtinguiſh by the appellation of *Cannabis fructifera*, Off. *Cannabis ſativa*, C. B. P. *Cannabis mas*, J. B. *Cannabis fœcunda*, Dod. Pempt. and which is commonly termed male hemp, ſhould be called ſeed-bearing hemp, or female hemp; becauſe it is this which, with the help of the impregnation it receives from the *farina fecundans* of the male, produces ſeeds capable of yielding plants of either ſpecies.

What may chance to be the future proportion between the number of male plants, and that of female, in a hemp-ground, cannot poſſibly be gueſſed at the time of ſowing, as no ſort of mark can be diſcerned on the ſeed, by which they may be diſtinguiſhed: nor indeed can any judgment be formed in this reſpect, before the male plants begin to flower, that is to ſay, in general, till about two months after ſowing: unleſs it be from a remark which the moſt curious obſervers have made, that the male hemp is ſlenderer than the female, and that all its parts are more delicate: to which may be added, that the male plant is always forwardeſt in its growth, and that it generally riſes about half a foot higher than the female; thereby plainly indicating it to be the deſign of nature, that the fecundating duſt which iſſues from the flower may by that means be the more eaſily conveyed to the grain on the ſeed-bearing ſtalks, in order to its impregnating that ſeed.

With regard to the temperature of the air that is fitteſt for the growth of hemp, M. du Hamel obſerves, in his Treatiſe on Cordage, that this plant does not like hot countries; that temperate climates ſuit it beſt; and that it thrives very well in pretty cold regions, ſuch as Livonia and Canada, which produce it in abundance, and very good. M. Marcandier is indeed of opinion, that though extremely hot countries are not favourable to its growth, yet, as this plant is but a ſhort time in the ground, it may be cultivated in any place that is habitable by men.

The wiſe legiſlature of this country has ſhewn its opinion of the importance of raiſing hemp in our own dominions, by the bounty given by parliament for the importation of it from North America; and our truly laudable Society for the Encouragement of Arts, Manufactures, and Commerce, has likewiſe judiciouſly contributed to this deſirable end, by offering a very conſiderable premium to the cultivators of hemp in that vaſt province of the Britiſh empire.

The ſoil for hemp ſhould be a ſoft rich loam, eaſily brought into fine tilth; and it ſhould be well manured. Newly broken up land is found to be peculiarly good for this plant; but flat grounds lying on the ſides of rivers, and enriched by the ſediment left on them when the waters overflow, are the beſt of all for it. If hemp is to be

be ſown on very ſtrong ſoils, they muſt be brought into ſo good tilth, and be ſo well manured, that their mould may remain looſe: in this caſe, ſuch ſoils yield very great crops. Dry lands are not fit for hemp: it does not riſe well in them, but remain ſhort and ſtinted in its growth, and its fibres are then generally too woody, which renders them hard. All theſe are conſiderable defects, even for the coarſeſt works. It is however true, that, in rainy years, it ſucceeds better on dry grounds, than on moiſt: but as ſuch years are not the moſt common, the beſt ſituation for hemp-ground is generally thought to be along the ſide of a ſtream, or of a ditch ſo full of water, as that the water may conſtantly be nearly on a level with the ſurface, but without overflowing it while the hemp remains on the ground.

It is the cuſtom in ſome countries to form hemp-grounds, which are appropriated ſolely to this purpoſe: whereupon the author of a very judicious account of the culture of hemp, in the Memoirs of the Royal Society of Agriculture at Tours, juſtly obſerves, that, "beſides that all ſoils delight in a change of plants, hemp is ſo far from impoveriſhing the ground, that the leaves which fall from it become a ſufficient manure, and the depth to which the roots go, eſpecially if the crop of hemp be great, leave the ground ſufficiently looſe to ſow upon it even a crop of wheat immediately after the hemp has been pulled, without any other expence than ſowing the ſeed and harrowing it in; or if turnips or a ſpring crop be more convenient to the farmer, theſe alſo will thrive well after the hemp. It is ſaid, that the hemp which grows on an eſtabliſhed hemp-ground is ſofter and more ſilky than that which is raiſed elſewhere: but the difference, if any, is very inconſiderable; for the hemp which grows in the other parts of Anjou, for example, is found to be as good as that which is produced by any of the few eſtabliſhed hemp-grounds in that province."

As it is eſſential to have the ground in exceeding fine tilth, the firſt ploughing ſhould be given it as early in the autumn as the huſbandman's other buſineſs will permit. Some are ſo curious in the preparation of their ground for hemp, that they give this firſt ſtirring by hand: and though it be a more tedious and more expenſive way than ploughing, they think that the difference of the crop repays them well. In whatever manner it be done, the ground ſhould be looſened as deep as poſſible, and laid rough, that it may be the better mellowed by the winter's froſt, eſpecially if the ſoil be ſtrong. If the hemp is to be ſown on ground purpoſely broken up, and which is covered with coarſe graſs, or other ſimilar productions, its ſurface ſhould be pared off and burnt; or it ſhould otherwiſe be brought to a perfectly fine tilth. The ground ſhould be ploughed again in February, or more early if the ſeaſon will permit; and then alſo ſhould be laid on the manure, whether of horſe dung, or the ſcouring of ponds and ditches, after it has had time to ripen; for theſe are preferable to cow-dung; though all manures, which render the earth light, are fit for hemp. Mr. du Hamel remarks, that marle is not, to his knowledge, uſed for this purpoſe. He likewiſe thinks, that it is beſt to dung the hemp ground every year before the winter ploughing, in order that the dung may have time to rot during that ſeaſon, and that the ſpring ploughing may afterwards mix it the more thoroughly with the earth: for all hemp grounds ſhould be well dunged at leaſt once a year.

To prepare the hemp ground thoroughly for receiving the ſeed, it ſhould have two or three good ploughings in the ſpring, or even more if the farmer's conveniency will permit, and the nature of the ſoil be ſuch as to admit of them; for the more frequently it is ſtirred in the ſpring, in proportion to the quality of the ſoil, the better the crop will be. About a fortnight or three weeks ſhould intervene between each of theſe ploughings, and they ſhould at laſt lay the ground quite ſmooth and even. If any lumps or clods of earth yet remain after all theſe ploughings, they ſhould be broken by hand; for the whole hemp ground muſt be as level, and of as fine a mould as the beds of a garden.

The firſt ſpring ploughing ſhould be given acroſs the former: and before the next ploughing is the proper time to ſpread ſheeps dung, pidgeons dung, poultry dung, or whatever other ſuch like manures are uſed; though ſtill it is to be feared, that, if the ſpring prove dry, theſe hot dungs may burn the ſeed, which they would not do if they were laid on before the winter: but in this caſe a greater quantity of dung muſt be uſed, or leſs advantage muſt be expected from it.

The neceſſity of manuring land every year for hemp, and at the ſame time the uncertainty of the ſucceeding ſeaſon, whether it ſhall be hot and dry, or cold and moiſt, render the culture of hemp a matter of much difficulty to the farmer, what quantity of manure to lay upon the land, and of what quality; eſpecially if manured with dung. There are two methods of avoiding this difficulty in ſome meaſure; one is, to give a light dreſſing at firſt, and as the ſeaſon advances, to give the land repeated hand dreſſings with powdered manure, ſo be from time to time ſown over the crop, and repeated according to circumſtances of weather, and appearance of the crop. This may be done at a ſmall expence, and is ready at all times; ſuch fine manure is readily waſhed into the ground by the firſt ſhower of rain, and the effects of it are quickly viſible, which will direct the farmer what kinds of manure are moſt proper, and when to repeat the dreſſings. A mixture of different kinds of manure, is in general moſt proper for this uſe, or ſometimes of one or two ſorts only, ſuited to the nature of the land: but of whatever kind the manure is, it ſhould be previouſly dried, and pounded fine. Such dreſſings are excellent for many kinds of plants; which they cheriſh and bring forward gradually, much more agreeably to the courſe of nature, than it is to lay on a large quantity of manure at once, the good or bad effects whereof depending upon the ſeaſon, muſt ever be very precarious.

When hemp is cultivated principally for the ſeed, it is much the beſt way, as obſerved in the culture of flax, to ſow it thin, to give it room to ſpread and throw out many branches, which will produce much ſeed; and if the plants are raiſed on beds or ridges, in rows, and horſe hoed, the ſeed will be much ſuperior to what is obtained from broad caſt hemp.

This plant may be alſo cultivated to great advantage, in reſpect of both ſeed and hemp, by drilling it in equidiſtant rows, and hand hoing; which will improve the land and crop, with leſs manure, than ſowing it by hand.

The ſeaſon for ſowing hemp depends in a great meaſure on the quality of the ſoil. In dry light ground, it ſhould be ſown as ſoon as the danger of froſt, or other inclemency of the weather, is over, in the latter end of April or beginning of May, that ſo it may get up early, and, by co-

vering

vering the ground, prevent the danger of drought. In wet cold grounds, it ſhould be ſown later, that is to ſay, not till the ſun has exhaled the too great moiſture of thoſe grounds; and this may not be till the middle, or even the latter end of May. The author of the before-mentioned account of hemp, in the Memoirs of the Royal Society of Agriculture at Tours, adviſes to ſow hemp even ſo late at the latter end of June, in caſe the ſeaſon for it be not favourable ſooner; and he obſerves, that the crop ſown then will be as plentiful, and of as good a quality, as if the ſowing had not been delayed ſo long, eſpecially if a very dry ſeaſon does not come on immediately after. The truth of this is evinced by the experience of thoſe who are obliged to ſow a ſecond, and ſometimes a third crop, when their former ſowing has miſcarried through the inclemency of the weather, and particularly of froſt, which is a great enemy to hemp. Another reaſon too, which he aſſigns in favour of late ſowing of hemp, is, that the huſbandman may by this means have an opportunity of deſtroying the firſt growth of weeds, which would choak the hemp, if it were ſown before they had come up.

The huſbandman ſhould be particularly attentive to the weather, when he ſows hemp, for the ſeaſon then ſhould neither be too dry, nor too rainy. If either of theſe is the caſe, he had better defer his ſowing: though he ſhould, if poſſible, always chooſe a time juſt after a gentle fall of rain.

The hemp ſeed that is ſown ſhould always be of the growth of the preceding year, becauſe, as it is a very oily grain, its oil is apt to become rancid, if it be kept long, and the ſeed then loſes greatly of its vegetative power, inſomuch, that, when it is two years old, many of the grains will not riſe at all; and if it be older, a yet leſs quantity will grow. Experience has alſo proved, that, as in other grain, ſo likewiſe in this, it is adviſable every ſecond or third year to chooſe the ſeed from a ſoil different from that on which it is to be ſown.

When the ſoil is deep, and in fine order, it is beſt to ſow this ſeed thick, eſpecially if the hemp be intended for fine uſes, becauſe the plants run moſt into height, when they ſtand cloſeſt together, and their fibres are then by much the finer. They ſhould not, however, ſtand ſo very thick as to choak one another; becauſe this would occaſion a conſiderable loſs of plants. It is therefore neceſſary to obſerve a medium, the knowledge of which is eaſily acquired by practice: and indeed, in general, hemp grounds ſeldom are too thinly ſtocked with plants, unleſs when part of the ſeed has been deſtroyed by froſts, drought, or other accidents. The uſual quantity is three buſhels to an acre.

As ſoon as the hemp ſeed is ſown, it muſt be carefully covered with earth, either by means of a harrow, if the ground has been ploughed, or with a rake, if it has been dug by hand; and beſides this precaution, the whole hemp ground muſt be conſtantly watered till the ſeed has riſen; for otherwiſe numbers of birds, and eſpecially pigeons, will deſtroy it entirely, without ſparing even the ſeeds that have been well buried. It is true, that pigeons and birds which do not ſcratch, do no great hurt to the grains of corn that are well covered with earth; but the huſks of theſe grains do not riſe up out of the ground with their green ſhoots, as thoſe of hemp always do; and then it is that theſe birds, miſtaking them for perfect ſeeds, tear them away with the young plants to which they adhere and thereby commit vaſt havock. So greedy are the pigeons, in particular, after theſe ſeeds, that none of the common ways of frightening birds will keep them off; nay, M. du Hamel aſſures us, that he has ſeen ſtrong men, and even dogs, ſo wearied out with fatigue, as to be forced to give up the taſk, when the hemp ground has been large. Happily this troubleſome work does not laſt long; for when the hemp has put forth a few leaves, it requires no farther tending.

Though hemp cannot be weeded without great hazard of damaging the crop, becauſe whatever plants of it are twiſted, bent down, or broken, through inadvertence of the weeders, or by any other cauſe, never riſe again; yet if the weeds are ſo numerous and rank, as to endanger their ſmothering of the hemp, it is neceſſary to root them out, and the moſt careful perſons muſt be employed for this work, which, when rightly executed, is alſo attended with this farther advantage, that the pulling up of the weeds looſens the ſurface of the earth, and thereby forwards the growth of the plant.

In very dry ſeaſons, it will be proper to overflow the hemp ground, if it can be done. To this end ſome authors adviſe letting in the water from the ditches, as is practiſed for rice grounds. If any parts of the hemp ground are in danger of being burnt up, it will be adviſable to water them, or perhaps rather the whole in ſuch caſe, even by hand.

If, by any accident, the hemp grows very thin ſo as to be thereby in danger of branching out too much, and of becoming woody; this ſhould be an additional motive for keeping it perfectly clear of weeds, in order to let it remain for ſeed, which will be ſo much the better for the plants having ſtood thin.

The male hemp (which is the ſpecies that produces the *farina fœcundans*) ripens earlier than the female, generally by three weeks, or even a month: but the time of the ripening of either depends much on the nature of the ſoil. The male hemp ſhews its ripeneſs by turning yellow at top, and whitiſh at the bottom of the ſtem: but this ſort, in particular, ſhould be pulled rather before it is quite ripe, that is to ſay, while it is yet ſomewhat green; for if it be too ripe, its fibres will adhere ſo ſtrongly to the reed, as not to be ſeparated therefrom, without ſome loſs; neither will they be ſoft, and conſequently not ſo fit for domeſtic uſes, as thoſe of hemp that is pulled before it has attained to a perfect maturity.

The ripeneſs of the female or ſeed-bearing hemp, is known, not only by the ſame ſigns as that of the male, but alſo by the ſeeds beginning to turn brown, and by the capſules which contain them beginning to open.

As ſoon as the male hemp is ripe, it is pulled ſtem by ſtem, and with caution, not to injure the female hemp, which, as we before obſerved, muſt remain on the ground ſome weeks longer, that is to ſay, till it alſo is ripe, and then it muſt likewiſe be pulled ſtem by ſtem.

Each handful that is thus pulled ſhould conſiſt of plants, as nearly as poſſible of equal length, and their roots in particular ſhould be placed as even as can be. Some tie up each handful, eſpecially of the male hemp, with a ſtalk of hemp, then lay it in the ſun to dry its leaves and flowers, which they afterwards beat off, by ſtriking it againſt a tree or wall; they then put ſeveral of theſe handfuls together, ſo as to form a pretty large

large bundle, and in this condition they carry it to the watering place.

We have juſt mentioned what M. du Hamel ſays of the common practice of drying the hemp before it is ſteeped: but we muſt here obſerve, that it is a matter of doubt, whether this plant ſhould be dried before it is ſteeped. Thoſe who are for drying it firſt, ſay, that the hemp becomes thereby ſtronger than when it is ſteeped without having been previouſly dried: for my part, I muſt confeſs, that this drying ſeems to me to be a needleſs trouble; for as it is neceſſary in the ſteeping of hemp, that a certain degree of putrefaction ſhould ariſe, ſufficient to deſtroy the texture of that glutinous ſubſtance which connects the fibres to the woody part of the hemp, it certainly is more adviſable to lay the hemp in the water as ſoon as can be after it has been pulled, becauſe the more there is of the natural moiſture left in this glutinous ſubſtance, the ſooner the putrefication will begin. If, either by deſign or accident, the hemp has been dried, the putrefaction comes on more ſlowly and more unequally, and the fibres contract a hardneſs which the ſteeping afterwards will not eaſily correct.

The common height of hemp, when full grown, is from five to ſix feet: but M. du Hamel remarks, that the ſtems of the hemp which is cultivated near Biſchwiller, in Alſace, are ſometimes upwards of three inches in diameter at their bottom, and above twelve feet high. Theſe, indeed, are ſo deeply rooted, that even a very ſtrong man can hardly pull them up.

When the female hemp is let ſtand till its ſeed is perfectly ripe, its bark becomes woody, and ſo coarſe, that no future operation can bring it to a proper degree of fineneſs. For this reaſon, it is generally pulled before the ſeed is quite ripe: but as it is manifeſtly the huſbandman's intereſt to ſow none but the beſt ſeed, he ought not to grudge the ſacrificing of the goodneſs of a ſmall part of his hemp, to the ſuperior advantage of obtaining perfect ſeed by letting a proper number of theſe plants ſtand till their ſeeds have attained full maturity. The judicious M. de Chateauvieux, whoſe attention extended to the moſt proper method of cultivating every uſeful plant, did not neglect ſo important an object as the quality of the hemp employed in cordage, and the means of obtaining its ſeed in the greateſt perfection. However, not having had opportunities of continuing his experiments long enough to draw certain concluſions from them, he invites all thoſe who have the public good at heart, to make experiments which may lead to the utmoſt improvement of the culture of this plant: "but, ſays this friend of mankind, theſe motives of œconomy are vaſtly inferior to the ineſtimable advantage of ſaving ſhips, their cargoes, and their crews, which often depends on the ſtrength of their ſails and cables."

On the twenty-ſixth of April, 1753, he ſowed ſix beds with his drill plough, placing ſix rows in each bed. The beds were ſeven feet wide, and the ſoil ſtrong, but in very fine tilth. He treated his plants with great care, according to the principles of the New Huſbandry: but both that and the enſuing year were unfavourable to the growth of hemp. However, he obſerves, in general, that his plants were five or ſix feet high, that their ſtems were large, and their bark very thick and ſtrong. They were very fruitful in ſeed, eſpecially the two outer rows, which had profited moſt by the hoeings. M. Aimen, from forty plants of hemp raiſed in the common way, and which might be deemed fine ones, had only a pound and an half of ſeed; but a ſingle plant which grew by itſelf, yielded him ſeven pounds and a half, of much better ſeed than any that is produced in the common way. From hence it reſults, that it muſt be of great advantage to the huſbandman to ſet apart a ſpot of ground ſufficient to rear thereon as many plants of hemp, as will afford him ſeed enough for the purpoſe of ſowing, and to cultivate them according to the principles of the New Huſbandry.

In ſome countries, to complete the ripening of the ſeed, round holes are dug, about a foot deep, and three or four feet in diameter, in different parts of the hemp ground, and the handfuls of pulled hemp are ſet as cloſe together as can be in theſe holes, with their ſeed ends downward, and their roots uppermoſt; after which, to keep them in this poſition, the whole is tied round with bands of ſtraw, and the earth that was taken out of the hole is thrown up all round this great ſheaf, ſo as quite to bury the heads of the hemp, which, when thus covered, heat by means of the moiſture contained in them, in the ſame manner as a ſtack of green hay, or a heap of dung. This heat completes the ripening of the hempſeed, and diſpoſes it the more eaſily to quit its huſks; and when it has been brought to this condition, the hemp is taken out of theſe holes, where it would become mouldy, if it were left longer in them. But, as is juſtly obſerved in the excellent Memoirs of the Royal Society of Agriculture at Tours, it is hard to conceive, how an operation which tends to bring on at leaſt ſome degree of putrefaction, can ripen the ſeed; and therefore this muſt be at beſt a very dangerous practice, eſpecially as a ſeed ſo very oily as that of hemp, and conſequently ſo apt to become rancid, cannot but be liable to be rendered ſtill more ſo by this degree of heat.

In other places, where the crops of hemp are great, the huſbandmen do not bury the heads of their ſeed hemp in the manner above deſcribed, but only lay it in heaps, with the ſeed ends one againſt another: others, whoſe crops are ſmaller, content themſelves with ſpreading upon the ground a cloth to receive their hempſeed; and others again only ſpread their bundles upon a clean ſpot of ground, with all the heads turned the ſame way. The ſeed ends thus placed are beaten ſlightly, either with a ſtick, or a light flail. The ſeed which falls out eaſieſt is always the ripeſt and beſt, and ſhould therefore be reſerved for ſowing the next ſpring: and as to that which remains in the heads of the hemp after this operation, it is got out by combing the heads on the teeth of a ripple, which pulls off the leaves, the huſks of the ſeeds, and the ſeeds themſelves, all together. Theſe are gathered in a heap, and left in that condition for a few days, in order that they may heat a little, after which they are ſpread out to dry, then they are threſhed, and finally, the ſeeds are ſeparated by winnowing and ſifting. This ſecond ſeed is much inferior to the firſt, and accordingly it is uſed only for extracting oil from it, or feeding of poultry.

It is, on this occaſion, juſtly remarked in the Memoirs of the Royal Society of agriculture at Tours, that by the threſhing of hemp there is always danger of bruiſing ſome of its ſeeds, and that the bruiſed ſeed will not grow, though it may be fit for yielding oil. Nor is this all; for by threſhing out the ſeed, there is a mixture of imperfect ſeed with that which is fit for ſowing; and this is the reaſon why huſbandmen have always found it

neceſſary to ſow a greater quantity than would otherwiſe be requiſite, in order to make up for the uncertainty of its growth.

The method of ſeparating the fineſt grains of wheat for ſowing, by throwing the corn to a diſtance on a barn floor, is equally adviſable for obtaining the heavieſt and beſt hemp ſeed, where proper care has not been previouſly taken to provide ſuch. In this caſe, the ripple may be uſed to ſeparate the whole of the ſeed from the plant, and this will prevent the inconveniencies which ariſe from the threſhing or beating out of the ſeed.

The method of laying the hemp down in order to its being ſteeped, is to place it in bundles at the bottom of the water, there to cover it with a little ſtraw, to keep the dirt from ſticking to it, and then to load it with pieces of wood and large ſtones, to keep it down, ſo that it may be always five or ſix inches below the ſurface of the water.

The intention of ſteeping the hemp in water is, to make its bark part the more eaſily from the reed, and to deſtroy the outer ſkin; or, if I may here be allowed the languague of anatomiſts, the cellular membrane which connects the hemp with the reed. All this is effected by only a ſmall degree of putrefaction, ſo that it is dangerous to let the hemp lie too long in the water, for it will then be over ſteeped, that is to ſay, the water will not only have acted upon the outer ſkin and the connecting fibres, but it will alſo have leſſened the longitudinal coheſion of the fibres; in ſhort, the hemp will be too much rotted, and in this caſe the ſtrength of thoſe fibres will be proportionably impaired. On the contrary, when the hemp has not lain long enough in water, its bark adheres to the reed, its fibres are hard, and they cannot ever after be rendered ſufficiently fine. There is therefore a medium to be obſerved; and this medium depends, not only on the length of time that the hemp is to retain in the water, but alſo,

1. On the quality of the water; it being ſooner ſteeped ſufficiently in ſtanding water, than in a running ſtream; and ſooner in ſtagnant putrid water, than in that which is clear.

2. On the temperature of the air; for it requires leſs time to be ſufficiently ſteeped in hot weather, than in cold.

3. On the quality of the hemp: that which has been raiſed on a rich mould where it has not wanted for water, and which has been pulled whilſt yet a little green, being ſooner ſteeped to a proper degree, than that which has grown on a ſtiff or dry ground, and which has been let ſtand till it was quite ripe.

In general, when the hemp has been ſteeped but a ſhort time, its fibres are thought to be the better. Hence ariſes the opinion, that hemp ſhould not be ſteeped but in hot weather; and for this reaſon alſo it is that many, when the autumn is cold, defer the ſteeping of their female hemp till the next ſpring. It is likewiſe for the ſame cauſe that ſome prefer ſteeping their hemp in ſtanding water, or even in ſtagnant waters, that is putrid, rather than in ſpring or running water.

M. du Hamel, to whom we are indebted for the foregoing remarks, ſteeped hemp in different ſorts of water, and it appeared to him, that the fibres of the hemp ſteeped in putrid ſtanding water were ſofter than thoſe of that which had been ſteeped in running water: but they contract in water which does not run, a diſagreeable colour, which does not indeed do any real injury to the hemp, for that which has been thus ſteeped is afterwards the moſt eaſily bleached; but yet, as this colour diſpleaſes, and the hemp is the leſs ſaleable for it, endeavours are always uſed, if poſſible, to make a ſmall ſtream of water paſs through the ſteeping places, thereby to change the water in thoſe places, and to prevent its becoming putrid.

He ſucceeded likewiſe in rendering hemp fit to ſeparate from the reed, by ſpreading it upon a meadow in the ſame manner as is practiſed for bleaching of linen: but he found this method tedious and troubleſome; nor did the fibres of the hemp ſo prepared ſeem to him to differ much from thoſe of hemp ſteeped in the common way.

He alſo tried the boiling of hemp in water, in hopes of bringing it ſpeedily to the ſame condition as it is in when taken from the uſual place of ſteeping: but when, after having been boiled upwards of ten hours, it was taken out of the water, in order to be dried, it was not at all fit for either peeling or breaking. It is true that, while it yet remained hot and wet, its bark ſeparated eaſily from the reed; but at the ſame time it peeled off like a ribbon; the glutinous ſubſtance which connects the longitudinal fibres, and makes them adhere cloſely to each other, not being at all deſtroyed, ſo that they could not be ſeparated, nor was it poſſible to divide them into fine threads. It is evident from what has now been ſaid, that no preciſe time can be fixed for the ſteeping of hemp; ſince the quality of the hemp, that of the water, and the temperature of the air, haſten or retard this operation.

M. Marcandier is of opinion that the fineſt and cleareſt water is always the beſt for ſteeping hemp; and he approves of the method of thoſe who make a kind of ditch on the edge of a river, where the water, being more ſtill and warm, ferments eaſily, and penetrates more quickly the parcels of hemp that are laid in it. When they are taken out of this ditch, it will be ſufficient to waſh them in the current of the river, which will carry off all the gum and mud that would otherwiſe cleave to them. He holds, that the hemp which has been ſteeped in rivers is always whiteſt, and of the beſt quality; and that that which has lain in ditches, pools, or reſervoirs of ſtanding water, is always of a bad colour, has a very diſagreable ſmell, is loaded with dirt, and loſes a great deal in the dreſſing. Theſe are M. Marcandier's ſentiments on this ſubject, and if they are the reſult of his experience, as I preſume them to be, I cannot but regret his not having related the particulars of his experiments.

The judiciouſly accurate Memoirs of the Society which the illuſtrious ſtates of Brittany have eſtabliſhed for the improvement of Agriculture, Commerce, and Arts, are more particular in this reſpect, and conſequently more ſatisfactory. After obſerving, that it is ſtill undetermined whether hemp ought to be ſteeped in running or ſtanding water, that each cultivator of this plant gives the preference to the method he has been uſed to follow, and that naturaliſts have not yet written any thing deciſive on the choice of the waters fitteſt for this preparation, the moſt important of any that hemp undergoes, becauſe it is on this that the eaſe and goodneſs of the hackling, ſpinning, and fabricating in a great meaſure depends; the Memoirs, I ſay, of theſe zealous patriots inform us, that one of the members of their office at Rennes thought that this

this diverſity of opinions and cuſtoms might proceed from running water's being, in fact, always preferable in ſome caſes, and from ſtanding water's being always the beſt in others. For example; in cold and rainy years the plant muſt be weaker, longer green, and fuller of juice, than in dry years, in which laſt the hemp will be ſtronger, but at the ſame time harder and more woody. Why then, ſay they, very judiciouſly, ſhould it be expected that the ſame waters applied to ſuch different productions, ſhould have a ſimilar effect upon each?

To remove all doubt in this reſpect, the Society ordered ſome hemp to be pulled in different parts of the province of Brittany, and in different ſtates of growth. Some was pulled before it was ripe, ſome exactly when it was ripe, and ſome ſeveral days after it was ripe. Each of the parcels of theſe three ſorts of hemp was divided into two equal parts, one of which was laid to ſteep in running water, and the other in ſtanding water. They were afterwards hackled with very great care, and examined with the moſt ſcrupulous attention by a perſon thoroughly acquainted with the defects and good qualities of this commodity.

Minute accounts of every circumſtance attending theſe experiments, and of their reſult, were ſent to the office at Rennes; and the Society, ſenſible of the vaſt importance which the aſcertaining of this point may be of in many reſpects, deſired that they might be repeated in one and the ſame year on the hemp of all the diſtricts of the province, and the reſult of their firſt experiments was as follows:

1. There was a ſenſible difference between the ſame hemp pulled in the three-ſtates before mentioned. 2. All the hemp that was ſteeped in running water, was incomparably whiter than that of the ſame quality which was ſteeped in ſtanding water. 3. The hemp which was pulled before it was ripe, acquired the greateſt degree of whiteneſs. 4. The whole of the loſs of ſubſtance, upon ſumming up the waſte occaſioned by each particular preparation, was leaſt upon the whiteſt hemp; but that which had been ſteeped in ſtanding warer, yielded a greater quantity of fine fibres, and the great loſſes in point of quantity fell upon the firſt dreſſing. 5. The hemp which was judged to be the beſt before it was hackled, did not always preſerve its ſuperiority when hackled. That which was at firſt looked upon as only of a middling, or even of an inferior quality, proved to be the fineſt and beſt after it was hackled. This obſervation is of great importance, eſpecially when the hemp is intended for naval uſes.

"We ſhall not, add theſe truly intelligent patriots, limit our inquiries to a bare repetition of theſe experiments. We purpoſe to extend them further, in order to have facts which may be entirely relied on. We ſhall cauſe the beſt hemp and beſt prepared of each different kind of hemp to be ſpun by the ſame hand, into as ſmall and fine threads as the hemp is capable of affording, that ſo we may judge to which of the different manners of ſteeping this plant the preference is due, by the greater diviſion of which its fibres may be ſuſceptible. Theſe threads ſhall be exactly weighed, and ſhall undergo ſimilar preparations in exactly ſimilar leyes; after which they ſhall be weighed again, in order to judge of their goodneſs by the diminution which each ſhall have ſuffered in the leyes, and by the degree of whiteneſs which each of them ſhall acquire. Theſe experiments, though extremely uſeful in themſelves, are, however, only introductory to a greater enterprize: they will lay a ſure foundation for the improvement of every manufacture of hemp, and particularly of ſail-cloth, which is an article of the utmoſt importance to all commercial nations."

The memoirs of the Royal Society of Agriculture at Tours, for the year 1761, prefer river-water, eſpecially that of rivers which run upon a bed of ſand, as the beſt for ſteeping of hemp; becauſe this water, being clear, renders the colour of the hemp brighter than it would otherwiſe be, as there is not any filth therein to ſully it: and it peels the more eaſily when ſo ſteeped, not being there liable to ſo great a degree of putrefaction, as to break the coheſion of the fibres of its bark. It is not, however, here meant, that the hemp ſhould be ſteeped in the bed of the river, becauſe the inequality of the motion of the water on the ſides, and in the middle of the hemp, would prevent the ariſing of that equal degree of putrefaction which is in this caſe eſſentially neceſſary. On the ſide of ſuch rivers, a hollow ſhould be dug three or four feet deep, and proportioned in extent to the quantity of hemp to be watered.

As it is contrary to law that the places for ſteeping hemp be made in running-water, it would be of advantage to contrive them ſo that the waſte-water from the ſteeping places ſhould run off upon paſture-grounds; becauſe the quantity of putrid vegetable matter which the water wherein hemp has been ſteeped carries along with it, would greatly enrich thoſe grounds; and with this view likewiſe all the water of pools or other places uſed for the ſteeping of hemp, ſhould be thrown out of them upon the graſs, as ſoon as the hemp has been removed.

It is eſſential to take heed, that the hemp be not, by any means, laid to ſteep in water in which there are any animals that might be apt to gnaw it; for theſe would cut aſunder, and totally deſtroys its fibres. Of this kind are, in particular, thoſe creatures which ſome people call freſh-water ſhrimps.

The common method of judging when the hemp has been ſufficiently ſteeped, is by trying whether the bark parts eaſily from the reed, and can be peeled off its whole length without breaking; for in this caſe it is thought to have been watered enough. However, it muſt alſo be allowed, that long practice enables the peaſants who cultivate hemp to give it, generally, a due degree of ſteeping, though they do ſometimes miſtake: and it is alſo to be obſerved, that it is the conſtant cuſtom of ſome countries to ſteep their hemp more than others. But the ſureſt way of all to diſtinguiſh whether the hemp has been ſteeped enough, is, as the Tours Memoirs remark, to take ſome of the ſtems out of the water, and then to try whether the extremity of the roots ſnaps off ſhort, and whether the bark ſeparates clear from the reed, its whole length; for in theſe caſes it is certain that the hemp has been ſufficiently watered, and it ſhould then be immediately taken out. If the bark does not ſeparate equally, but ſtops chiefly at the ſmall knots which appear on the ſtem, this ſhews that it has not been ſteeped enough.

The uſual duration of the ſteeping of the male hemp is from three to ſix days, according to the weather; and of the female hemp, from five to eight or ten days: but as only a ſmall degree of too much or too little ſteeping is equally hurtful, the utmoſt attention ſhould be exerted to hit the preciſe time of its being duly watered.

Some injudiciouſly, neglect to waſh their hemp when it

is taken out of the water, becauſe, ſay they, the filth brought out of the water with it will afterwards fall off: but, in the drying of the hemp, this filth gives it a bad colour, and the duſt which ariſes therefrom is extremely prejudicial to the health of the workmen.

When the hemp, after having been properly ſteeped, is taken out of the water, the bundles of it ſhould be untied, and ſpread upon the ſand, or upon ſtrong rocky ground; or, if neither of theſe be at hand, it may be laid upon a field that has been lately reaped, and where the ſtubble ſtill remains ſtanding. This ſtubble will keep it hollow, and it will dry the ſooner. Some dry their hemp by ſpreading it out and ſetting it upright againſt a ſunny wall, or by laying it along the ſide of a ditch. Graſs is not fit for laying it on, becauſe there will ariſe from thence a moiſture which will rot the hemp. For this reaſon it is, that the place where hemp is ſpread to dry, ſhould be as free as poſſible from every kind of damp. When the hemp is thoroughly dry, it is bundled up again, and carried home, where it ſhould be kept in a very dry place till it is wanted for peeling or breaking.

The method of peeling hemp is ſo ſimple, that a deſcription of it would be needleſs; even children, and the aged and infirm may perform it with eaſe, by only taking one ſtalk after another, breaking the reed, and ſlipping off the bark. This may likewiſe become the employment of every perſon belonging to the farm in winter evenings, and at ſuch times as the weather will not admit of their working without doors. It muſt however be allowed, that there are ſome inconveniencies attending this method: the peeled hemp comes off in ribbands, which do not anſwer in the hackling ſo well as that which has been broken; more of the uſeleſs membranes, eſpecially towards the root, ſtill adhere to it, and, by increaſing its weight, render it, to uſe the common ſaying on this occaſion, better for the ſeller than for the buyer; beſides which, the hemp does not always peel off in equal lengths, and from thence ariſe conſiderable diſadvantages, and loſs in its future dreſſings.

The hemp which is to be broken ſhould firſt be rendered very dry; becauſe the reed will then be the more brittle, and therefore part the more eaſily from the bark. There are ſeveral ways of drying. Meſſieurs Du Hamel and Marcandier deſcribe a kind of cave or cavern, in which it is commonly dried in many parts of France. This cavern is generally ſix or ſeven feet high, five or ſix feet wide, and nine or ten feet long. A hollow under a rock is often properly made uſe of for this purpoſe: but as that cannot always be met with, it frequently is neceſſary to have recourſe to art. In this caſe, ſome form the top of their vault with dry ſtones, others cover it with broad flat ſtones, and others again only cloſe it with pieces of wood, over which they lay a quantity of earth ſufficient to ſtop up all the interſtices: but which ever of theſe methods is taken, the drying place ſhould be ſo ſituated as to be ſheltered from the north and north-eaſt winds, and be open to the ſouth, that it may receive the benefit of the ſun; becauſe the uſual ſeaſon for breaking of hemp is in clear froſty weather, when the buſineſs of the field is ſuſpended.

At about four feet above the floor of this drying place, and two feet from its mouth or entrance, three bars of wood, about an inch thick are placed acroſs the cavern, from ſide to ſide, and there fixed. On theſe bars is laid, about ſix inches thick, the hemp that is to be dried. A careful perſon, which generally is a woman, then keeps conſtantly burning, under the hemp ſo laid, a ſmall fire made of the fragments of the reeds of hemp that has already been broken or peeled. The perſon thus employed muſt be extremely watchful, becauſe, as this kind of fuel is ſoon conſumed, and muſt of courſe be frequently repleniſhed in order to keep a conſtant and regular fire all over the hearth (for this is abſolutely neceſſary) very great care muſt be taken that the flame do not ever riſe ſo high as to ſet fire to the hemp, which is exceedingly combuſtible, eſpecially after it has been dried ſome time. The ſame perſon takes care alſo to turn the hemp from time to time, in order that it may be dried equally in all its parts; and likewiſe to put on freſh hemp, when the former is dry enough to be taken away and ſent to the break.

Where but a ſmall quantity of hemp is to be dried, an oven is doubtleſs the ſafeſt method; and when the hemp is dreſſed at home, it may perhaps be dried as faſt by this means, as the other avocations of the family will admit of its being wanted. The only attention requiſite in this caſe, is that the oven be not ſo hot as to endanger the fine and thender fibres of the hemp: for too great a heat may not only ſcorch them, but likewiſe ſo parch the oil in the hemp, as that the hemp will afterwards remain harſh and dry, and not be ſo eaſily whitened as it might otherwiſe be.

It alſo is uſual, where the quantity of hemp is greater than can be managed with an oven, to dry it on a kiln; and this is a good method; provided the fire here be alſo very moderate, and made of ſuch materials as do not blaze or ſparkle, becauſe of the great aptneſs of dry hemp eaſily to take fire. Coke is perhaps the very beſt fuel that can be uſed for this purpoſe.

The operation of breaking hemp, by which general term is however ſtrictly meant only the breaking of the reed, which ſome call the bunn, or woody part of the ſtem, within the bark; for the bark itſelf, of which is made the filamentous ſubſtance that is ſpun and uſed in manufactures, only bends under the hand of the dreſſer, and does not break: this operation, I ſay, has hitherto generally been executed three ways, namely, by beating the hemp with beetles, which is a laborious and tedious work; or by the Dutch hand-break, which is in every reſpect much preferable to the beetle; or by fluted rollers worked by horſes, wind, or water, but of choice by the latter, where a running ſtream can be procured. This laſt is more expeditious, and leſs laborious than either of the other ways; but is dangerous to the workmen employed therein, becauſe, if by any inadvertence the rollers ſhould catch hold of their fingers, the loſs of a limb at leaſt is inevitable. The only means of preventing this dreadful conſequence, in ſuch a caſe, is to have an iron crow at hand, ready to clap inſtantly between the rollers, as is practiſed in ſugar works, which are of a ſimilar conſtruction.

The fluted rollers are undoubtedly the beſt inſtrument for breaking hemp, becauſe the length of the ſtalk and ſtrength of the reed of this plant muſt render the Dutch-break a very tedious operation, eſpecially when large quantities of hemp are raiſed, as muſt be the caſe wherever a ſufficiency of it is cultivated to anſwer the purpoſes of the great and important manufactures in which it is employed in this nation.

The

The Moravian hemp mill, uſed in America, is alſo a good inſtrument. It conſiſts of a large heavy ſtone, ſhaped like a ſugar loaf, with the ſmall end cut off. A body of that form will go round in a circle, if it be moved on a plane. This is moved by a water mill, and the hemp, being laid on the floor, in its way, is bruiſed by the weight of the ſtone paſſing over it.

After the hemp has been broken, it undergoes a ſecond operation, which is commonly termed ſwingling or ſcutching. The intention here is to ſeparate the reed from the hemp, and this is done by one or other of the following ways. In the firſt, the workman takes a handful of hemp in his left hand, and holding it over the edge of a board, ſtrikes it with the ſharpened edge of a long, flat, and ſtrait piece of wood, commonly called a ſwingle hand, or ſcutcher. The author of the thirty-ſeventh letter in the Dublin Societies Weekly Obſervations recommends that the cutting edge of the ſcutcher be made of a circular form, in order that its greateſt force may fall on the middle of the hemp, and thereby ſpread it, by which means it will be the more equally cleared of the remaining broken pieces of the reed. But this method is, at all events, very laborious and tedious; and therefore water mills have been erected, in which ſeveral ſcutches, fixed in the ſame axle-tree, are moved with great velocity. Here the work is performed with great expedition, and much leſs fatigue to the workmen; but a greater waſte is made of the hemp, owing to the velocity with which this engine is turned.

Before the hemp thus prepared is hackled, it uſually undergoes a third operation, called beetling, the deſign of which is to looſen and thereby more thoroughly ſeparate its fibres. The beetles uſed for this purpoſe are moved either by hand or by water.

We have already deſcribed the inſtruments invented by Mr. Macpherſon for performing theſe operations with very great facility, under the article flax, and therefore need not be repeated here. *See the article* FLAX.

Mr. Mercandier propoſes, inſtead of ſcutching and beetling the hemp, to give it a ſecond ſteeping after it has been peeled or broken, the better to ſoften the bark that may ſtill remain hard, and not be eaſily brought to a proper degree of fineneſs. For this purpoſe, the hemp intended to be ſteeped a ſecond time is divided into ſmall parcels; theſe are tied looſely round the middle with a piece of packthread, in order that they may be managed eaſily without mixing or entangling them; and the hemp thus tied is laid in a veſſel filled with water, where it is left, more or leſs time, according to the hardneſs of its fibres, and the quantity of glutinous adherent matter remaining on it. Three or four days are always ſufficient for this purpoſe: but a leſs time will do, if the hemp wants only to be cleared of that adherent matter. When it has been thus ſteeped long enough, it ſhould be waſhed very clean in a running ſtream; and if many of the fibres of the hemp are found to cling together in what our author calls ribbands, he adviſes to beat them in the manner that linen is beaten in bleaching.—It is ſafer to err in too little, than in too much ſteeping; becauſe, after the fibres have been looſened in the break, they will be the more liable to be deſtroyed by even only a ſlight degree of putefaction. When the fibres of the hemp are ſufficiently diſengaged from each other, they ſeem, while immerſed in water, to be as compleatly dreſſed as if they had already paſſed through the hackle. After this watering, the parcels are opened, ſpread on a board, and laid in the ſun to dry.

M. Marcandier obſerves farther, and likewiſe from his own experience, that after this preparation, the hemp may be again ſteeped and waſhed in a leye of pot-aſh or wood aſhes, rendered perfectly clear of all filth. This will undoubtedly contribute to the removing of any ſuch matter ſtill remaining in the hemp, as muſt neceſſarily fall off in the future preparations, before the manufacture made of the hemp is fit for uſe. And, indeed, a leye of this kind bids fair to be of ſervice in the preparing of flax as well as hemp; becauſe, both being thereby perfectly freed from every particle which muſt otherwiſe fall off in the future operations of hackling, ſpinning, bleaching, &c. the cloth or other manufacture made of them will be proportionably better and more durable. The time taken up in bleaching will, in particular, be very much ſhortened thereby.

In the whole of this proceſs, the water ſhould be warm, becauſe warm water acts more powerfully than cold in diſſolving the impurities which are to be ſeparated from the hemp; and it is alſo an indulgence to the people employed in this buſineſs, who might otherwiſe be more apt to ſlur over their work. It will therefore be moſt adviſable to perform this operation when the weather is moderately warm, thereby to ſave the trouble and expence of making fire to warm the water or the leye.

M. Marcandier having experienced the efficacy of horſe-cheſnuts in the bleaching of linen and cleanſing of woollen ſtuffs, made likewiſe uſe of a ſolution of them in water, as a leye for preparing hemp in the manner above deſcribed. The method of preparing this leye is as follows: the cheſnuts are peeled, and then raſped as fine as poſſible into ſoft water, in the proportion of two, or, at moſt, three nuts to every quart of water. This is done ten or twelve hours before the mixture is to be uſed, and in the mean while it is ſtirred from time to time, the better to diſſolve theſe raſpings and impregnate the water. The laſt ſtirring is given a quarter of an hour at fartheſt before the water is drawn off from the coarſer part of the raſpings, which ſinks to the bottom; and this is done, either by inclining the veſſel and pouring the leye off gently into another, or by lading it out by hand, while the water is yet white, and froths like ſoap-ſuds. In order to uſe this leye, it is made rather hotter than the hand can well bear, and the hemp is then ſteeped and waſhed in it, as in ſoap-ſuds.

The hemp thus prepared is carefully dryed, laying the fibres ſmooth and as little intermixed as poſſible. When dry, it is doubled, and twiſted at the ends, or tied up in bundles. The farther buſineſs of the hemp-dreſſer need only be an eaſy beating of the hemp, and that chiefly to ſeparate the fibres that may have clung together in the drying, and to the common operations of the hackle. The dangers ſo often fatal to the dreſſers of hemp from the duſt drawn in with their breath, will alſo be hereby in a great meaſure avoided; and the hemp thus prepared will be white, ſmooth, ſoft, and flexible.

The ſame author extols highly the various uſes to which hemp thus prepared, and even its tow, or what is ſeparated from it by the hackle, may be applied. This hemp, he informs us, may be dyed like ſilk, wool, or cotton, and may be made into cloth, ſtuffs, and garments of all kinds; and that a great advantage attending the uſe of this material is, that it will not be in danger of being deſtroyed by thoſe worms which eat woollen cloth. Theſe advantages attending hemp prepared in the manner which

Mr.

Mr. Marcandier has propoſed, may well deſerve the farther experiments and attention of our manufacturers, eſpecially at Mancheſter, or wherever elſe our mixed ſtuffs are made.

HEPS, the fruit of the ſpecies of wild roſe, generally written hips.

HERBAGE, graſs, paſture in general. It is alſo uſed to ſignify the tythe and right of paſture.

HERD, a number of beaſts together, generally black cattle.

HERDSMAN, a keeper of herds, one employed in tending cattle.

HIDE, the ſkin of beaſts, but particularly applied to thoſe of large cattle, as bullocks, cows, horſes, &c.

HIDE *of Land*, was ſuch a quantity of land as might be ploughed with one plough within the compaſs of a year, or ſo much as would maintain a family; ſome call it ſixty, ſome eighty, and ſome an hundred acres.

The diſtribution of this kingdom by hides of land is very ancient, mention being made of it in the laws of king Ina. Henry I. had three ſhillings for every hide of land, in order to raiſe a dowry for his daughter: this tax was called hidage.

HIDE-BOUND, a diſtemper in horſes, when the ſkin ſticks ſo faſt to the back and ribs, that the hand cannot ſeparate the one from the other, without great difficulty; his body is at the ſame time lean, his backbones ſtand up, his guts are for the moſt part deficient in moiſture, and his dung dry, and more offenſive than common.

If a horſe become hide-bound by hard riding and ill keeping, he may be cured by good keeping. If it be the effect of a fever, or ſome other diſeaſe, if that be cured which is the cauſe, the effect will ceaſe; but if he has no fever upon him, and he is hide bound only from lowneſs of blood and ſpirits, give him boiled barley, whitewater, or the like, and when his fleſh is raiſed, harden it with good oats, beans, and moderate exerciſe.

HILL, an elevation of ground, leſs than a mountain, a down.

HILLOCK, a little hill.

HIVING *of Bees*, the placing a ſwarm of bees in a hive, in order to have the benefit of their labours. *See the article* BEE.

HOE, a tool made like a cooper's adz, to cut up weeds in gardens, fields, &c. This tool is commonly called the hand hoe.

This inſtrument is of great uſe, and ſhould be more employed in hacking and clearing the ſeveral cornets, cracks, and patches of land, in ſpare times of the year, which would be of no ſmall advantage thereto.

Horſe HOE, a large kind of hoe, drawn by horſes, and uſed to ſtir the intervals in the New Huſbandry, and clear the corn from weeds.

Under the article CULTIVATOR, we have deſcribed the inſtruments uſed abroad for this purpoſe; and ſhall here give two very uſeful inſtruments of the ſame kind, invented by the ingenious Mr. Hewitt, who preſented them to the Society for the Encouragement of Arts, &c. where they may be ſeen. The following letter, deſcribing theſe inſtruments, was ſent by the inventor to the Society.

GENTLEMEN,

Peruſing the Eſſays on Huſbandry, I obſerved particularly, that the author, page 105, expreſſeth hopes of ſeeing ſome "new invented plough, cheap, ſimple, and rightly calculated for deſtroying weeds; keeping plants clean; and ſtirring the ground;" and, page 106, further ſays, "now as moſt people prefer uſeful, and cheap, to elegant and expenſive inventions, it is natural to wiſh for a hoe plough entirely ſimple, and not coſtly. For the mechaniſm of thoſe deviſed hitherto, by the ingenious lovers of agriculture, is of ſo perplexed, and complicate a nature, that it will no ways anſwer the common purpoſes of huſbandry: but, being perpetually out of order, will throw the poor ploughman into deſpondency; and the rather, as neither he, nor the country plough-wright, can comprehend how to rectify any defects, or accidents, except with extreme difficulty."

The very name of a hoe-plough ſuggeſted the idea of an inſtrument, which I ſhall call a horſe-hoe; whoſe conſtruction is intirely new, ſimple, and much leſs coſtly than a common plough, ſuch as country plough-wrights, and ſmiths, are able to make; and ſuch as common ploughmen are able to uſe: and which ſeems, according to the hopes of the aforeſaid author, to be rightly calculated for deſtroying weeds, keeping plants clean, and ſtirring the ground.

This horſe-hoe, a model of which I beg leave, in the moſt reſpectful manner, to preſent to this honourable Society, I hope may be of very extenſive uſe in agriculture as it muſt be much more efficacious, and expeditious too, than any kind of hand-hoe for the diſtruction of weeds, and ſtirring the ground. For if the inſtrument does not cut below the crown, or head, of the roots, ſuch roots will ſprout again, and the firſt labour become fruitleſs; which indeed is too often the caſe of hand-hoeing: as the labourer, ſometimes only ſcratches the ſurface of the earth, and ſhaves off the leaves of the weeds, the roots remaining intire and unhurt, to vegetate again. With this inſtrument the huſbandman may hoe the ground ſo deep, that it will infallibly cut aſunder the roots of every weed it meets with, below the crown or head; and conſequently, either deſtroy them, or at leaſt greatly check their future growth that ſeaſon.

This inſtrument is calculated for hoeing in the intervals between the generality of plants in ſtraight rows: ſuch as tranſplanted lucerne, beans, peas, and turnips, ſown with a drill plough, &c. In large gardens, hop-grounds, nurſeries and plantations of young trees, much labour and expence in hand-hoeing, may probably be ſaved by the uſe of it.

In the county of Norfolk (and probably in many other places) the huſbandmen, in the months of March and April, preparing their lands for barley, generally give them a certain number of earths, according to the phraſe of that country; or, in other words, plough them a certain number of times. In thoſe months the weather is frequently very dry; and the ſoil being turned over and over again, and expoſed to the ſun and wind, becomes ſo duſty, that a great part of the ſeed will not grow without rain; which ſometimes not falling in many weeks after the ſeed-time, cauſeth the crop to conſiſt of different growths; ſo that when the firſt grown crop is ripe for the ſcythe, the latter is but juſt eared. This evil, perhaps, may, in ſome meaſure, be remedied by the uſe of this horſe-hoe, inſtead of the common plough, at that ſeaſon; for this will ſtir, and looſen the earth as effectually, as the other; and at the ſame time, neither remove, nor turn it over, which ſeems to be beneficial, in a drought, upon very light and ſandy ſoils.

With

With reſpect to foul ſummer fallows too, it may be of ſingular ſervice. The common plough buries the weeds, of which many grow again. This horſe-hoe will cut their roots aſunder, below the ſurface of the earth; and by leaving their foliage above it, expoſed to the ſummer ſun, the greateſt part of them will wither and die: ſo that they will not give the huſbandman much more trouble the remaining part of the ſummer. And, as this hoe may be eighteen or twenty inches broad, two acres of land may be hoed by it, as ſoon as one acre can be ploughed, by the common plough.

This new inſtrument is intended for public benefit; and to the conſideration of the public, as well as of this honourable Society in particular, it is freely ſubmitted. If it be judged an uſeful implement in huſbandry, well; if not, the pleaſure that has ariſen from the hope of doing good has amply rewarded, for his trouble, the inventor, who has the honour to ſubſcribe himſelf,

GENTLEMEN,

Your moſt humble,

and obedient ſervant,

WILLIAM HEWITT.

Hadleigh,
April 19, 1766.

P. S. Since I had compleated this model, I apprehended, that its utility might be rendered ſtill farther extenſive, by a very ſmall alteration; therefore, gentlemen, I take the liberty of laying before you another model, calculated for hoeing the furrows between wheat ridges, which all farmers acknowledge to be very good huſbandry, though many of them are deterred from the practice of it, for want of a cheap expeditious method of putting it in execution. An inſtrument of this kind, I am perſuaded, will very greatly expedite that uſeful work; and if it meets with your approbation, gentlemen, many lovers of improvement in agriculture may be induced to give it a fair and impartial trial.

An Explanation of the HORSE-HOE, *Plate* XVII. *Fig.* 3.

A repreſents a ſmall round curved iron-bar, fixed upon each end of the axle of the wheel, by which the horſe-hoe is drawn.

B, the wheel three feet in diameter.

C c two flat iron bars, three feet long, fixed upon the axle of the wheel, at D d, and to the ſides of the hoe; at E e, by bolts and ſcrews: upon theſe bolts, as well as the axle of the wheel, they are moveable.

F, a ſmall round iron-bar, faſtened at each end, into the two bars; C c (to ſtrengthen them) at G g, from and to G, theſe bars may be ſtraight. From G to E, let them be curved.

H, the hoe itſelf; the breadth of which may vary according to the different diſtances of the rows of plants, whoſe intervals are to be hoed.

K K, two little flat curved iron-bars, fixed by bolts, upon which they are moveable, to the bars C c. Each of them paſs through a ſtaple, fixed into the ſides of the hoe at I, I. In both theſe little bars is a row of holes. In each of the ſtaples, is one hole; and, directly oppoſite to them, one hole in each of the ſides of the hoe: and, by means of two bolts, paſſing through theſe holes, and ſome of the holes in the bars K K, the hoe is fixed to any poſition; ſo that the ground may be hoed as near the ſurface, or as far below it, as is neceſſary.

M M, two wooden handles, fixed to the two ſides of the hoe, and to each other, by the croſs bar O; as long and as high from the ground, as the handles of a common plough.

Figure 4, repreſents the horſe-hoe, intended for hoeing the furrows, between wheat ridges: which differs only, in one reſpect from the other. That hoe is flat; this is curved. The breadth, and curvature of this muſt depend intirely upon the breadth and curvature of the furrows, to be hoed. In which reſpect, every ſenſible farmer can eaſily direct the ſmith how to form it. But, after all, if any perſons be inclined to make trial of this inſtrument, I would adviſe them not to truſt to a verbal deſcription, but to ſend for a model of it to Thomas Tillet, a very ingenious ſmith at Hadleigh in Suffolk.

This hoe is ingeniouſly contrived, and ſerves very well to cut the weeds near the ſurface of the ground; but none of the broad hoes can go deep, and in that reſpect, are deficient in one of the purpoſes of hoeing, namely, to improve the land; which cannot be done in any great degree, but by deep tillage: for which reaſon, when this, or any other broad hoe is made uſe of to cut the weeds near the ſurface of the ground, another inſtrument ſhould follow that goes deeper. It is no recommendation of this or any hoe, that it neither removes the earth, nor turns it over: for turning it, and expoſing a new ſurface to the influences of the atmoſphere, is one of the principal means of fertilizing land, as is found by experience, in the practice of the New Huſbandry.—For this reaſon alſo, this inſtrument is improperly named a plough; for the idea of a plough, is not only to raiſe a furrow, but alſo to turn it; neither ſhould any inſtrument be named a hoe-plough, or horſe-hoe; theſe names being given to the plough invented at firſt, to be uſed in the New Huſbandry for deep hoeing; and generally continued to be ſo called by the practiſers of that huſbandry. Other hoes, that are drawn by horſes, may, more properly, and by way of diſtinction, be called cultivators.

HOEING, the breaking or dividing the ſoil by tillage, while the corn or other plants are growing thereon.

It differs from common tillage, which is always performed before the corn or plants are ſown or planted, or in the time of performing it; and it is much more beneficial to the crops than any other tillage. This ſort of tillage is performed various ways, and by means of different inſtruments. Land which, before the tillage, would have yielded little, though the more it is tilled before ſowing, the more plenty of corn it yields, yet, if tilled only before the ſowing, will always have ſome weeds, and they will partake of the advantage of the tillage as well as the corn. This is one reaſon for an after tillage, ſuch as that by hoeing. But there is another conſideration that yet more requires it; this is, that as ſoon as the ploughman has done his buſineſs, by ploughing and hoeing the land, after ſowing, the ſoil, of its own accord, begins to undo it all again by tending towards its original texture and ſpecific gravity again; the altering of which was the only buſineſs of all the former tillage. The breaking the particles of the earth, and making in it new pores, and new particles, or new ſuperficies, is the great buſineſs of the plough and harrow; but, as ſoon as their uſe is over, the

ear

earth begins to coaleſce again into its own form, the particles unite together, and the artificial pores in a great meaſure cloſe up. The ſeed is nouriſhed in a worſe ground than it was firſt put into, and the more the plant grows up, and requires a larger ſupply of food, the worſe the paſture becomes. While nouriſhment is thus denied the growing plants, they are at the ſame time choaked with weeds, which being of a hardier nature than they, will grow with leſs ſupplies, and therefore thrive more vigorouſly, and rob them of a great part of the little food the land before allowed them.

Framers in all ages have been acquainted in ſome degree, with the uſe of tillage and dung to crops of uſeful plants; but they have ſo ill managed the time of giving theſe aſſiſtances to nature, that there is no doubt but one third part of the nouriſhment raiſed by dung and tillage, if it were given to plants and corn at many proper ſeaſons, and proportioned to the different times of their exigencies, would be of more benefit to the crop than the whole is, when applied all together at the time of ſowing.

Nature, by what ſhe does in the animal œconomy, ſeems to point out to us ſomething like the remedying this by hoeing; for when the teeth, as the plough, have tilled that ſoil or maſs which is earth altered; and when the ſaliva and the juices of the ſtomach have ſerved to divide and attenuate it, as the ſalts of dung and other manure do land; after all this, the bile and pancreatic juices are ordained to farther attenuate it, at the very time when it is ready to be exhauſted by the numerous mouths of the lacteals, ſituate in the inteſtines. This laſt operation of theſe juices ſeems analogous to the meliorating the ſoil by hoeing, after the plants are grown, and are becoming fit for uſe.

Tranſplanting is nearly allied in its nature to hoeing, but it is much inferior. The nature of this will not admit of its being a general thing; and even if it would, hoeing is better: for by tranſplanting, the plants can only be kept up to a certain period, after which they will not bear it; but hoeing may be uſed to them with advantage, to their utmoſt ſtanding, and make them vigorous all the while.

The roots of a plant are all neceſſarily broken off in tranſplanting, and it requires ſome time for it to ſtrike a whole ſet of new ones; and if the earth about it is not kept thoroughly moiſtened all this time, the new formed roots will not be able to ſhoot, and the plant will ſtarve in the midſt of plenty: but, on the contrary, in hoeing, the ſame advantage of a new paſture for the plant is obtained, by the breaking the particles of the earth, and at the ſame time no more of the roots are broken off than can eaſily be ſupplied, and the reſt remaining in their places, the plant continues growing without that ſtop or decay, which muſt happen on tranſplanting, and which it recovers only by degrees. It is obſerved, that ſome plants are the worſe for tranſplanting: lucerne and ſaintfoin are never ſo good after tranſplanting, as when they are left in their native places, at the ſame diſtances; and finochia, removed, is never ſo good and tender as when it is not.

This laſt plant receives ſuch a check from tranſplanting in its infancy; that it has afterwards a diſeaſe like the rickets, which cauſes knots and ſwellings in it, that ſpoil it as a delicacy. All the tap-rooted plants ſuffer by tranſplanting; for it is neceſſary in this to cut off the long main-root, which afterwards, however good the ſoil may be, never arrives at the length it otherwiſe would have had, and which was neceſſary for the ſucceſs of the plant.

One great benefit of hoeing is, that it keeps plants moiſt in dry weather, the advantage of which to their growth is eaſily ſeen. This good office it performs on a double account. Firſt, as they are better nouriſhed by hoeing, they require leſs moiſture, and conſequently carry off leſs; for thoſe plants which receive the greateſt increaſe, having moſt terreſtrial nouriſhment, carry off the leaſt water, in proportion to their augment, as is proved by Woodward's experiments. Thus barley or oats being ſown on a piece of ground, well divided by tillage and dung, will come up and grow well without rains, when the ſame grains ſown on another part of the ſame land, not thus dunged or tilled, will ſcarce come up at all without rain; or if they do, will wait wholly for the rains for their growth and increaſe.

The hoe alſo, particulatly the horſe-hoe, for the other does not go deep enough, procures moiſture for the roots from the dews which fall moſt in dry weather; and theſe dews ſeem to be the moſt enriching of all moiſture, as it contains in it a fine black earth, which will ſubſide from it in ſtanding, and which ſeems fine enough to be the proper pabulum, or food for plants.

A demonſtration that the tilled earth recieves an advantage from theſe dews, which the untilled does not, is this; dig a hole in any piece of land, of ſuch a depth as the plough uſually goes to; fill this with powdered earth, and, after a day or two, examine the place, and the bottom part of this earth, and bottom of the hole, will be found moiſt, while all the reſt of the ground, at the ſame depth, is dry. Or, if a field be tilled in lands, and one land be made fine by frequent deep ploughings, while another is left rough by inſufficient tillage, and the whole field be then ploughed acroſs in dry weather, which has continued long, every fine land will be turned up moiſt, and every rough land as dry as powder from top to bottom.

Although hard ground, when thoroughly ſoaked with rain, will continue wet longer than fine tilled land adjoining to it, yet, this water ſerves rather to chill than to nouriſh the plants ſtanding in it, and to keep out the other benefits of the atmoſphere; it leaves the ground much harder alſo than before, when it is finally exhaled out of it: and when, at length, the earth is then hardened, it can receive no benefit from any thing leſs than a deluge of rain, which ſeldom falls till the ſeaſon of vegetation is over.

As fine hoed ground is not ſo long ſoaked with rain, ſo the dews never ſuffer it to become perfectly dry. This appears from the flouriſhing ſtate of plants in hoed ground, while others near them, but in ground not hoed, are ſtarved for want of nouriſhment. The common opinion is againſt this, but obſervation proves it be true againſt the common opinion. The vulgar are guided by this, however, and will not hoe their ground in dry weather, for fear of letting in the drought, as they call it; whereas hoeing this, is the only method of keeping away the drought, and without either this, or watering, they muſt periſh in theſe ſeaſons. *Tull's Horſe-Hoeing Huſbandry.*

HOG, the name of an animal too well known to need any deſcription here.

Theſe creatures are very advantageous to the country-man, not only for their great increaſe, but alſo becauſe they

they feed upon what would otherwiſe be of no uſe or advantage, but would be thrown away; as whey, waſhings of tubs, grounds of drinks, diſh-water, grains, &c, and their fleſh being beſt ſalted, or kept in pickle, may be eat in the ſpring, when other meat is at the deareſt; beſides the help it affords to the taking off the produce of the garden, and the variety of the diſhes of the offal. Swine are indeed very greedy, and very apt to root up ground, and break the fences; and therefore the greater care muſt be taken to keep them both well rung and well yoked.

The largeſt ſwine, and the greateſt number for any particular places, are bred in Leiceſterſhire, and ſome parts of Northamptonſhire, and in the clayey countries adjacent; probably from the large quantities of beans and peaſe ſown in thoſe parts.

The wild kind are not ſo large as thoſe juſt mentioned, but are much more hardy, and better meat.

In the choice of hogs, chuſe ſuch to breed out of as have long, large bodies, are deep ſided and bellied, that have a ſhort noſe, thick thighs, ſhort legs, high claws, thick neck, a ſhort ſtrong groin, and a thick chine, well ſet with ſtrong briſtles.

To have too many ſows in one yard is not good, for their increaſe is ſo great, that they will, for want of food, not only devour whatever comes in their way, but eat one another: for a ſow will bring forth pigs three times in a year, that is, at the end of every ſixteen weeks. It is common for them to have thirteen or fourteen pigs at a litter; but the ſow can rear no more than ſhe has teats to ſuckle them with; the reſt muſt therefore be deſtroyed, or put to other ſows. If the ſow miſs the time of going to boar, that ſhe might in courſe have done, give her ſome oats parched in a pan, in her waſh, or the ſmall end of a runnet bag, and it will cauſe her quickly to go to boar. The pigs which you rear, after you have choſen out the beſt for boars and ſows, the male muſt be gelt, and the ſows ſpayed; the ſpayed gelts, as the farmers call them, are eſteemed the moſt profitable, becauſe they have a much larger quantity of fat upon their inwards, than other hogs. Young ſhoots, which are ſwine of about three quarters of a year old, are beſt for pork, and thoſe of a year, or a year and a half for bacon. The beſt age for a ſow to bring forth pigs, is from one to ſeven years old, and the beſt age for the boar, is from two to five years old, at which time it is beſt to geld him, or ſell him for brawn; the beſt pigs to rear, are thoſe which are pigged in the ſpring, and thoſe pigged in March for pork in October.

The beſt way of taking care of ſwine, is to feed them ſo as to keep them in middling plight, till you deſign to fat them; for if you keep them too fat, it will endanger their health; and too lean will render them too ravenous. It is good to give them ſuch ſwill as you have every morning and evening, to make them come home to their ſtyes. The reſt of the day, let them graze, and get ſuch food as they can; but when the corn is upon the ground, you muſt be careful to keep them within bounds. Moiſt ſedgy grounds are good for them, the roots of which they will eat; and all ſorts of haws, heps, ſloes, crabs, acorns, maſt, cheſnuts, &c. with which, if you have plenty enough to fat them, their fleſh will eat much better and ſweeter than if fatted in a ſtye. Some, indeed ſay, their fat will not be ſo ſolid, nor ſo profitable, and therefore they commonly ſhut them up for a week or ten days, and feed them with dry peas; but this a miſtake, experience having ſhown, that hogs fatted with acorns only, have their fat as ſolid as thoſe fatted with peas. In fatting hogs in ſtyes, they obſerve to give them meat often, and but little at a time, that it may be always freſh; and likewiſe to give them as much water as they will drink, and to keep them very clean, which will help their fatting, and improve the taſte of their fleſh. But where the huſbandman lives remote from woods, or the year ſhould fail of producing acorns or maſts, they commonly fat them wholly in ſtyes with peas, if cheap; if dear, the meal of barley, rye, or offal corn, according as they are cheapeſt, which they mix with water, whey, or ſkimmed milk: with theſe they feed them till fat, which will commonly be in about a month's time, and then they feed them with peas a little before they kill them.

Obſerve, that every ſtye have a yard well paved with ſtone, if poſſible, for the hog to go out and eaſe and air himſelf, that he may keep his lodging the cleaner.

In Leiceſterſhire they have a very eaſy method of fattening great numbers of ſwine, which they do by ſtacking up their peas and beans in the form of a ſmall cottage. This they ſet near ſome running brook, and hedge a yard in round about it; taking ſome part of the ſtream into the yard for the hogs to drink at: into this yard they turn ſuch a number of hogs as they think their peas or beans will fat, where they let them live till their proviſion is conſumed, cutting the rick down, and giving it to them as they can eat it. *Mortimer's Huſbandry, vol.* I. *p.* 244.

The London ſociety of arts having, ſome time ſince, offered a premium of 20 l. or a gold medal for the beſt account of rearing and fattening of hogs, in conſequence of which Mr. Young ſent them a ſeries of trials, as a candidate for their medal, and was honoured with it.—The following particulars are extracted from his eſſay.

"The importance of this animal to the farmer is not ſufficiently known in every part of England; there are many dairies that do not maintain one tenth of the ſwine they might, with proper management. Several garden roots are raiſed in large quantities, without being applied to feeding hogs; and clover is cultivated, in many countries, upon the largeſt ſcale, without its utility for the ſame uſe being the leaſt known. No perſon who has tried many experiments in this part of rural œconomy, can fail regretting, that ſo many farmers ſhould neglect a conduct that adds ſo much to the good of the public, as well to their own profit.

"There are two principal objects in the rearing and fattening hogs; firſt, to make the greateſt advantage of a dairy; and ſecondly, to ſubſtitute ſome other food, in the place of that which ariſes from cows, when none are kept.

"It is the practice of ſeveral counties to uſe the ſkim-milk, butter-milk, and cheeſe-whey in fattening hogs. This is a moſt pernicious cuſtom: that food, for ſuch a uſe, it is every where known has twenty ſubſtitutes, viz. peas, beans, buck-wheat, barley, &c. &c. but it is not ſo generally known that pigs may be reared without cows. It is agreed that the dairy food is excellent for the latter purpoſe.

"For this reaſon, I ſhall venture to propoſe a different conduct, and with the greater readineſs, as I have found it, by experience, to be more profitable than the common management. The dairy upon this improved ſyſtem ſhould be applied only to rearing pigs, and feeding ſows

which have young. But this at once opens a larger proſpect of the whole management of a farm.

"The ſows and weaned pigs ſhould evidently be proportioned in ſuch a manner to the number of cows in milk, as to conſume all the dairy food without waſte. And other ſorts of food provided for the keeping ſows that have no pigs; hogs half, three fourths, full grown, and fattening ones.

"The practice of ſome counties, as well as the annexed experiments prove, that clover is a moſt capital object in keeping all theſe ſorts of ſwine; but thoſe writers who aſſert that it will completely fatten them, go much too far. There is no ſort of cattle in a farm that requires more attention than hogs; any method, therefore, that ſimplifies the management muſt be peculiarly valuable.

"Hogs that are a quarter, (or upwards) grown, may be abſolutely confined to a clover field, until it is neceſſary to ſow wheat. Nine tenths of Britain will doubt this fact, but I have frequently experienced the truth of it. The fences, it is unneceſſary to add, muſt in this ſyſtem, muſt be incomparably good; which neceſſity, I apprehend, is a particular merit in a mode of huſbandry: for a conduct that forces the farmer to have excellent fences, is ſo far of great utility. It is alſo requiſite to add that there muſt be a pond in the field which never fails. In a good crop of clover, well fenced and watered, ſwine of this ſort may be locked up from the middle of May to Michaelmas, and no conſumption of the clover will pay the farmer better. I ſhall add an experiment or two to prove this aſſertion. I could inſert many, but a certain brevity is requiſite in ſuch ſlight eſſays as theſe. I have found lucerne to be equal, and in ſome years ſuperior to clover for this uſe. Sainfoine is alſo of excellent utility, but ray graſs and burnet will not by any means do; natural paſtures with waſh are a good ſubſtitute, but never will be found to equal the artificial graſſes.

Experiment of keeping hogs upon clover in the field.

"Sowed common red clover with barley in the ſpring of 1765, on two acres of woodcock, brick earth loam, on a clay bottom, that yielded beans, horſe hoed, in 1764. In October, 1765, manured it with thirty loads of compoſt, conſiſting of various proportions of farm yard dung, town manure, turf, ditch earth, &c.

"The fences around it were well repaired in the winter, and one, much worſe than the reſt, new made.—The 12th of May I turned in thirty head of ſwine, conſiſting of ſows, large pigs, and large half and three fourths grown; they took immediately to the clover, and in about a fortnight, all diſcovered by their looks, how well the food agreed with them. There was a pond in the field, at which they drank perpetually; and of nights they laid all of a heap, in a corner of the piece, under a thicket of buſhes, not making any attempts to get home, after walking the firſt evening once or twice around the border with that deſign. Finding that ſtock of hogs were inſufficient to keep down the clover, more were added, and ſome kept in the piece till Michaelmas. The account of the expence and produce is as follows.

EXPENCE.

Seed, 10 s. 9 d.—Sowing 6 d.		0	11 3
Manuring, at 20 d a load the manure, and the expence of carting it to the field.	}	2	19 4
Rent		1	14 0
		5	4 7

PRODUCE.

Keeping 15 hogs 21 weeks at 3d		3	18 9
Ditto 12 ditto 12 weeks at 3d		1	16 0
Ditto 10 ditto 16 weeks at 3d		2	0 0
Ditto 5 ditto 10 weeks at 2d ½		0	10 5
Ditto 12 ditto 10 weeks at 2d		1	0 0
Ditto 10 ditto 12 weeks at 1d ½		0	15 0
		10	0 2
Expences		5	4 7
Profit 2 l. 7 s. 9 d. ½ per acre.		4	15 7

"From the event of ſeveral other fields of clover this year, I am clear that no other uſe of it would have paid better than thus feeding it by hogs. A clear profit of forty-ſeven ſhillings per acre, after paying the expence of a good manuring, is conſiderable, and greatly preferable to the general profit by hay, the chance of the ſeaſons taken into the account. Nothing can be clearer than the fact of hogs thriving excellently on clover. All theſe ſwine grew very faſt, and ſhewed by their looks how well the food agreed with them, and there is no animal that ſooner falls off in its appearance than a hog, when badly fed. Where therefore is the neceſſity of providing other ſummer food? Why conſume that food for thoſe hogs which clover will maintain, while ſows and pigs, and weaned pigs cannot be kept without it, ſuch as dairy waſh, &c.

"This is a ſyſtem of management that will enable the farmer to keep much larger ſtocks of cattle, than the methods yet common in ſo many counties."

A profit 2 l. 7 s. 9 d. ½ per acre, is, no doubt, inviting to a farmer, to keep his hogs in ſummer upon clover: there is however another circumſtance that he ſhould conſider in this management, which Mr. Young has not taken notice of, but deſerves conſideration.

The intention of ſowing clover among ſpring corn, as oats and barley, is to obtain good crops of hay, and to prepare the land for wheat: for all ſucculent plants that ſtand thick upon land, ſo as to ſhade and cover it, are found to enrich it, as peaſe, buck-wheat, vetches, turnips, and clover. Moſt farmers are now ſenſible of this; it is an article of modern improvement, of great importance to them and the public. It is generally allowed that a full crop of clover prepares land for wheat almoſt equal to a fallow, and ſome think ſuperior.

The clover is fed off by cattle, or mowed: ſometimes it is mowed once, and afterwards fed, or it is mowed twice, and not fed. Whichever of theſe methods is purſued the land is improved: but as mowing of meadows often is known to impoveriſh them, it was long ſuppoſed that mowing clover had the ſame effect of impoveriſhing land, more than feeding it: but this is now found to be a miſtake: land is more enriched by clover, though twice mowed, than by feeding it all the ſummer, as has been found in the ſucceeding crop of wheat, by comparative experiments of both. The reaſon of this, and of the fertilizing effect of ſhade and cover, not being our preſent enquiry, let us proceed to the point now before us, the benefit of feeding clover with hogs. A method which will be more or leſs advantageous to the farmer, in proportion to the effect of it upon the ſucceeding crop of wheat, and this the farmer may judge of by the condition of his land, and the luxuriancy of the crop of clover.

clover. The wheat crop is his firſt object when that is intended to ſucceed, and the improvement of that is to be conſidered in the management of his clover, whether by mowing or feeding it.

"But in making the greateſt advantage of a dairy," continues Mr. Young, "we muſt not confine ourſelves to the ſummer keeping alone; proviſion muſt be made for winter feeding ſuch hogs as do not require aſſiſtance from the dairy. The following experimenrs will prove that carrots, parſnips, beets, and potatoes, are of admirable uſe in feeding pigs that have been reared. They will keep the hogs that are taken out of the clover in excellent order, and even fatten them, and maintain to vaſt advantage, ſows that have no pigs.

"By this general ſyſtem of management, it appears, that hogs are to be maintained the year through upon clover and theſe roots, and recourſe had to the dairy only for aſſiſtance in feeding ſows that have pigs, and in rearing their young. It muſt be extremely evident, that, with this conduct, the number of ſwine maintained on a dairy farm may be prodigious. The number of cows point out the number of ſows and pigs, and theſe again muſt proportion the number of acres applied to the production of clover and roots. Thus the whole chain of crops is connected, and each field the ſupport of the other.

"The ſecond object in the management of ſwine, is the ſubſtituting ſome food in the room of a dairy for rearing pigs, upon ſuch farms as keep no cows. This is an object of very great importance, as there are numerous extenſive tracts of country that will produce clover in very great perfection, and alſo many ſorts of roots; but where it is either unprofitable to keep cows, or only advantageous to ſuckle them.

"The reaſon I before gave, viz. keeping this ſketch in due bounds, prevents the inſertion of numerous experiments, which I formed for the particular determination of this point. I found, from repeated trials, that carrots and parſnips will wean pigs of a proper age almoſt as well as milk; that is, in ſuch a degree of perfection, as to render the keeping a large number of hogs upon that dependance, extremely adviſeable to any farmer, whoſe buſineſs or ſituation may prompt him to do it. And other experiments aſſured me, that ſows, with the moſt numerous litters, may be maintained to great profit in the ſame manner. Potatoes and red beets I likewiſe found of very great uſe for the ſame purpoſe.

"It may not be improper here to conſider the conſequences of enabling the farmer to keep large ſtocks of ſwine by means of roots, ſo extremly productive as thoſe I have mentioned. There are no ſoils but what, with proper management, will yield ſome or other of them, and the crops are immenſe. The number of ſwine to be fattened or fed by an acre of carrots or potatoes would ſurpriſe thoſe who have never formed any experiment upon the point; and the excellency of the huſbandry, in general, ſhould plead powerfully with our farmers to adopt it upon this principle. Theſe roots are all fallow-crops, that is, they are of the ſame advantage to the ſoils as a year of fallow, and if cultivated in the manner they ought to be much ſuperior to any fallow: for this reaſon, their culture is beneficial to the land, and a very material method of bringing it into excellent heart. Their application to feeding ſwine is alone ſufficient to improve a farm that is almoſt worn out, ſince it cannot be conducted without raiſing large quantities of the very beſt dung.

"Here the conſequence of adopting the culture of vegetables that clean and ameliorate the ſoil, and in their uſe infinitely enrich it, muſt be obvious to every reader. It is no exaggeration to aſſert, that the beſt ſoils may be improved, and the pooreſt converted into good ones by this conduct, and I can aſſert, on experiment, cheaper than by any other method. I have found that ninety hogs will in fatting, yield as much manure as was worth thirty pounds on the ſpot, and where ſtraw, ſtubble, or fern are to be had very cheap, to a much greater amount.

"It is from theſe ſeveral conſiderations that I apprehend the following experiments may be of real utility to thoſe who have dairies, to thoſe who keep cows, but apply them to ſuckling, to thoſe who have no cows, but are willing to keep ſwine; and laſtly, to thoſe who, on any ſoils, are deſirous of improving them."

Mr. Young then proceeds to relate ſeveral experiments he made of feeding and fattening hogs with different ſorts of food, whereof the following is a ſpecimen.

Experiment on feeding Hogs.

Exp. I. The firſt week in March, 1765, thirty pigs, juſt weaned, were drawn from forty-three, that they might be all of a ſize; they were then diſtributed into five lots, equally divided. I do not think there was half a crown difference in the value of them, and then fed with diſtinct ſorts of meat. Each five had a ſtye to themſelves, and all were kept clean and littered with ſtraw.

Lot. No. 1. was fed with pollard mixed with water.
2. with pollard mixed with ſkim-milk.
3. with boiled turnips, and pollard mixed with the turnip liquor.
4. with boiled potatoes and water.
5. with ſkim-milk.

They were kept with this food thirty days. I then turned them out of their ſtyes, (none had died) and viewed them with a perſon particularly ſkilled in hogs; the reſult was,

No. 2. the beſt—pollard and ſkim-milk.
5. the next beſt—ſkim-milk.
1. next—pollard and water.
3. and 4 equal.

It appears from hence that pollard and milk are the beſt food, milk alone very good. The other articles advantageous, (for none of the pigs were in bad order) though not equal to the former.

Exp. III. January 1, 1766, forty pigs, that had been weaned about a fortnight, were draughted very equally into eight lots, and confined each to a ſtye, they were cleaned out and littered on the ſame day, and equally. Their food was as follows.

No. 1. Raw carrots.
2. Boiled ditto.
3. Boiled potatoes.

4. Pollard mixed with ſkim-milk.
5. Pollard mixed with bolled turnips.
6. Malt duſt mixed with ſkim-milk.
7. Skim-milk.
8. Ditto and half carrot water boiled.

"They continued upon this food the month of January, and were then viewed, the reſult was as follows.

No. 4. the beſt—pollard and milk.
7. next—ſkim-milk.
2. ditto—boiled carrots.
3. ditto—boiled potatoes.
5. ditto—pollard and boiled turnips.
8. ditto—ſkim-milk and carrot water.
1. ditto—raw carrots.
6. the worſt—malt-duſt and ſkim-milk.
Two dead.

Pollard and milk hitherto maintain the ſuperiority, boiled carrots excellent, the reſt almoſt equal, except the malt-duſt, which is evidently bad.

Exp. IV. In the beginning of June, 1766, I confined ſixty hogs, half and three fourths grown, in my hog-yard, (a pond's mouth in it) and fed them fourteen days with clover, mown freſh every day; it was given in their troughs, with racks acroſs, to prevent their ſoiling it. They fell off in their looks in about four days, and grew worſe and worſe, ſeveral dying. At the end of that time, I gave them ſome malt, grains, and waſh every day for a few days longer, but the effect was no better, more dying. They were then all turned into the clover field from whence it had been taken, and confined conſtantly to it for ſome time. Not one more died, for all throve greatly. It will not perhaps be impertinent here to add, that I never found any method of uſing clover more beneficial than thus applying it to the feeding of hogs."

Exp. V. "At the time of the preceding experiment eight hogs, of equal ſize, were divided into two lots, and confined to two ſtyes. Four were fed fourteen days on clover mown, and the other four on lucerne mown; they were given at the ſame time, and in the ſame ſtyes. At the end of that time the ſame were viewed attentively: both were bad, but the clover ones much the worſt, one near dying."

Exp. VI. "In the month of December, 1766, twenty pigs, that had been weaned a month, were draughted into four parcels, and kept that month, ſeparately, in the following manner.

No. 1. Boiled carrots.
2. Boiled potatoes.
3. Boiled turnips.
4. Boiled cabbages.

"At the end of the month they were turned out and viewed attentively. The reſult was,

No. 1. the beſt—boiled carrots.
2. next—boiled potatoes.
3 and 4 equal—all nearly dead.

"Carrots continue, in every trial, ſuperior to all common vegetable food. I am not at all ſurpriſed at the ill ſucceſs of turnips and cabbages.

Exp. VII. "In June, 1767, I draughted from my hogs twenty that were of a perfect equality in ſize and appearance; they were even half grown; marked them into four lots, and turned

No 1. into my clover field.
2. lucerne ditto.
3. ſainfoine ditto.
4. burnet ditto.

"In another month they were drove up and viewed; the reſult was,

No. 2. the fineſt—lucerne.
1. next—clover.
3. next—ſainfoine.
4. very indifferent—burnet.

"The reſult of this experiment I think deciſive in favour of lucerne, and likewiſe in the proportionable merit of the other articles: but this muſt be farther enquired into in future experiments."

Observations.

"The general reſult of thoſe trials is drawn into one view, in a very few words.

Milk mixed with pollard appears to be, of all food, the moſt proper for rearing pigs.

Milk alone is good.

Boiled carrots excellent, and fully proved to be ſufficient for any farmer to depend on who does not keep a good dairy.

Potatoes alſo a very good food.

Turnips, cabbages, and malt-duſt very bad.

Of green food, that which is growing is clearly the beſt; mown, and given in ſtyes, it is pernicious.

In the field lucerne is ſuperior to all the reſt. Clover comes next, then ſainfoine, all theſe three are good. Burnet laſt and bad.

The next ſet of experiments were made in order to diſcover what kind of food was moſt proper for fattening hogs, given to them ſeparately, and the beſt mixtures of them for that purpoſe. The following example may be ſufficient to ſhow the comparative uſe of different kinds of food given ſeparately for fattening.

Exp. II. "In January, 1766, I drew from the herd ten hogs, as equal in ſize as poſſible, and weighed them alive in five lots.

	ſtone	lb.
No. 1. weighed	13	4
2.	12	6
3.	13	0
4.	12	11
5.	13	1

A nearer equality than this, in matters that can neither be added to nor diminiſhed, can ſcarcely be expected.

No. 1. was fatted with white peaſe, that weighed 56 lb. per buſhel; the price 30 s. per quarter.
No. 2. with pollard that weighed 22 lb. per buſhel; price 9 d. per buſhel.
No. 3. with buck wheat 47 lb. per buſhel; price 2 s. 3 d. per buſhel.
No. 4. with boiled potatoes 54 lb. per buſhel; price 2 s. per buſhel.
No. 5. with boiled carrots 55 lb. per buſhel; price 1 s. 1 d. per buſhel.

"I thought it beſt to fix on a given ſum, as proper to fat each hog. The people I conſulted were of opinion that eight buſhels of white peaſe were neceſſary to fat one ſuch hog well. This I accordingly fixed on as my criterion. The account of the expence therefore ſtood thus.

				l.	*s.*	*d*
No. 1. Peaſe, 16 buſhels				3	0	0
2. Pollard, 80 buſhels				3	0	0
3. Buck wheat, 27 buſhels				3	0	9
4. Potatoes, 28 buſhels at	2	16	0	3	0	0
Labour and coals	0	4	0			
5. Carrots, 49 buſhels	2	13	2	3	0	0
Labour and coals	0	6	10			

Each lot was weighed as ſoon as the food was done; The reſult was as follows.

	ſtone	lb.
No. 1. weighed	27	6
2.	27	9
3.	29	13
4.	25	7
5	31	0

"It is evident from this experiment, that carrots boiled are ſuperior to any other food. I did not expect that potatoes would be ſo much inferior; but I have found, from divers other trials ſince, that it is requiſite to mix the meal of ſome kind of corn with them. Pollard in this trial, as in the laſt, is ſuperior to peaſe."

With reſpect to the comparative fattening quality of carrots and potatoes, it appears by this experiment that lot No. 5. gained 17 ſtone 13 pound weight in fleſh, fed upon carrots; and lot No. 4. fed upon potatoes, gained but 12 ſtone 10 pound. The difference was 5 ſtone and 3 pounds of fleſh gained by feeding on carrots, more than was gained by their feeding on potatoes, a great ſuperiority when viewed in this light. But on the other hand, to gain this greater weight there was a conſumption of 49 buſhels of carrots, and but 28 of potatoes. But 49 buſhels of potatoes (the ſame quantity as the carrots) would, in the above proportion, advance ſuch a lot of hogs to the weight of 22 ſtone and 4 pounds; that is, to 4 ſtone 5 pound more in weight, than the ſame quantity of carrots did advance them, by which it appears that potatoes are really more fattening than carrots, of the ſame meaſure or weight. The hogs ſeem to reliſh carrots much, and they eat a great quantity of them; but taking an equal quantity of each, the potatoes go fartheſt in fattening hogs, a circumſtance that merits the farmer's attention; for it is much more difficult to find a ſoil that is proper for carrots than for potatoes, and the produce from an acre of potatoes is nearly as great, and frequently greater than the produce of carrots; nor is there much difference in the expence. This however is certain, that in moſt farms, there is much more land proper for potatoes than for carrots.

The price of the potatoes, in this inſtance, is indeed much higher than the carrots; but that is a circumſtance merely local, it is not ſo in all places; as the farmers may, in general, raiſe potatoes as cheap as they can carrots, and in much greater quantities.

The other experiments, in this eſſay, were made, in order to diſcover the fattening quality of ſeveral ſorts of food, when mixed together; pollard, bran, and of beans, peaſe, buck-wheat, and barley ground into meal; upon which the author makes the following obſervations.

"It appears from theſe experiments, that pollard alone, at the preceding prices, is a cheaper food than peaſe alone.

"That boiled carrots is much the moſt profitable food that has been tried.

"That buck-wheat is a more profitable food than peaſe.

"That ſeveral kinds of food mixed are better than given alone.

"That the meal of any one, or various kinds of grain is better, and more profitable than the whole grain mixed or alone.

"That peaſe and barley are a much ſweeter food than beans."

HOG-SHEEP, or *Hoggrel*, a ſheep of a year old.

HOLT, a wood.

HOLM, an iſland in a river; it alſo ſignifies the holly.

HOOP, a meaſure equal to a peck, or quarter of a buſhel.

HOP, a well known plant of the reptile kind, whoſe flower is a principal ingredient in beer, and other malt liquors.

A rich, deep, mellow, dry ſoil, rather inclining to ſand than clay, is, in general, beſt adapted to the cultivation of hops; but a black garden mould is excellent for this purpoſe. Stiff clays, ſpewy lands, ſuch as are apt to be overflown by floods, hard gravels, ſtony grounds, very ſandy ones, and ſuch as are not at leaſt a foot and an half deep, are altogether improper for hops.

The beſt ſituation for hop-grounds is ſuch as inclines to the ſouth, or lies open to it, ſo that they may have the benefit of the ſun during the greateſt part of the day. It muſt alſo be open, for the air to have a free paſſage and circulation between the plants, and it ſhould be ſo ſheltered to the eaſt, north, and weſt, that neither the froſty winds in the ſpring may cut off the young ſprouts, nor the more ſtormy ones in ſummer and autumn deſtroy the full grown hops.

The ground and ſituation being choſen, the next buſineſs is to prepare it for the planting. In many parts of England, when the ground is broken up for this purpoſe, the plough goes firſt, and men follow it with the ſpades, with which they dig one ſpit deep in the furrows where the plough has paſſed, throw up the earth thus dug, and ſo continue to plow and dig till the whole is done. Either this tillage, if it be well performed, or the deep ploughings, croſs-ploughings, and harrowings, by which careful huſbandmen prepare their land for corn, will fit this for being ſown with turnip ſeed in the end of July, or beginning of Auguſt, and if the turnips are hoed twice,

ſo

ſo as to be left about eight inches aſunder, they will yield a good crop, the weeds will be deſtroyed, and the ground will be rendered looſe and fine. Another good ploughing after the turnips are taken off, will, with the enſuing winter mellowing, render it fit for being planted with hops in the ſpring.

The beſt time to begin ploughing is in October, in order that the ſoil may be properly prepared to receive the benefits of the winter's froſts, rains and ſnows; after which, in the beginning of ſpring, it ſhould be well and deeply ploughed again, and well harrowed; and after another ploughing in March, which will be of very great ſervice, it ſhould be harrowed fine, and laid as even as can be.

When the ground is in proper readineſs for planting, ſtretch along a ſtraight ſide of the field, at fifteen or twenty feet diſtance from the hedge, and parallel to it, a line with knots or rags tied in it, as far aſunder as you deſign your hills to be, and ſtick in the ground a ſharp-pointed ſtick at every knot, as marks for the places where the hills are to be made; continue the line in this manner the whole length of the ground, and from this firſt row you may mark out the reſt of the field, either in ſquares, chequer-wiſe, at the intended diſtance of the hills, or in the quincunx form, where the hills of every row lie oppoſite to the middle of the firſt, in a triangular form.

The diſtance of the hills ſhould be, in ſome meaſure, regulated by the nature and goodneſs of the ſoil: but, in every caſe, they ſhould be far enough aſunder to admit the hoe-plough at all times without danger to the plants. If the ſoil be dry and ſhallow, ſix or ſeven feet will be a convenient diſtance: but if it be rich, moiſt, and apt to bear large hops and leaves, it may be right to allow eight or nine feet between the hills.

The moſt proper ſeaſon for planting hops, is from the beginning of March to near the middle of April, at the time when they begin to ſhoot. The Kentiſh huſbandmen approve likewiſe of October: but the common ſorts are not to be procured then, unleſs it be from a ground that is to be dug up or deſtroyed; beſides which there is ſome danger of their rotting in the earth, if the winter ſhould prove very wet.

There are ſeveral ſorts, though the botaniſts allow but one ſpecies of hops. The moſt eſteemed are, the long white, the oval, and the long ſquare garlic hop. Theſe differ from each other in the colour and ſhape of their bells, or hops, in the degree of bearing, and in their time of ripening. The long white is moſt valued, becauſe it is a great bearer, and produces the moſt beautiful hops; for the beauty of hops conſiſts in their being of a pale bright green colour. The oval hop is beautiful, but does not yield ſo large a crop. There is a ſort of this kind of white hop, called the early, or rath hop, which ripens a week or ten days before the common, and is therefore of advantage to thoſe who would be firſt at market: but it is tenderer than the other, and does not bear near ſo plentifully. The long ſquare garlic hop is the greateſt bearer, more hardy, and ſomewhat later ripe than the former; but by reaſon of its redneſs towards the ſtalk, it is not ſo beautiful to the eye, and therefore is not ſo much eſteemed as the other ſorts.

Few hop grounds are without ſome plants of a ſort of hop which many call the female hop, but very erroneouſly; for the female hop is that which is cultivated for uſe, and this, which others name more properly the wild hop, is the male. Towards the middle of July, it puts out a great number of long looſe bunches of ſmall flowers, not at all like the true hop; and in ſomewhat leſs than a month after, that is to ſay, juſt before the true hop begins to bloſſom, they ripen, and with the leaſt motion of the wind, ſhed a farina, which is wafted all around, and is by ſome, not improbably, thought to be of uſe to impregnate other hops. Thoſe who are of this opinion adviſe, therefore, to leave one or two hills of them ſtanding in the hop-ground. But the common practice is to mark them at their firſt appearance, and to root them out afterwards, becauſe they do not bear bells or hops, and as they are generally the ſtrongeſt plants, ſets might otherwiſe be taken from them by miſtake.

There is alſo a poor ſtarved hop, called a wild hop, which is not judged to be a diſtinct ſort, but a hop which has degenerated for want of culture.

The planter of hops ought to be extremely careful in the choice of his plants, or ſets, particularly in regard to the kind of the hop; for it is a great trouble and loſs to him, when his garden proves to be a mixture of ſeveral ſorts of hops, ripening at different times. He who plants the three ſorts abovementioned, viz. the early, the long white, and the ſquare hop, in three diſtinct parts of his ground, will have the conveniency of picking them ſucceſſively as they become ripe.

Hop ſets are cuttings from the roots or branches which grow from the main root or ſtock. They ſhould be procured, if poſſible, from grounds planted with none but the ſort which is deſired; and they ſhould be from five to ſeven or eight inches long, with three or more joints or buds on them, all the old bind and hollow part of the ſet being cut off.

The ground being prepared for planting, as before directed, towards the latter end of February, or in the beginning of March, if the ſoil be light, or late in March, if it be ſtrong and moiſt, make, in the places marked out by the ſticks ſtuck in them, holes about twelve or ſixteen inches wide, and of a depth proportioned to the nature of the ground. In general, ten or twelve inches will be a ſufficient depth. If the ground be ſhallow, and you meet with hard clay or gravel, by no means enter into this, for you would then make a baſon to retain water; but, in ſuch caſe, inſtead of going deeper, raiſe up a ſmall hill of good mould. If there is a good depth of rich mellow mould, dig the hole a foot and a half, or two feet deep, and you will find the hops thrive the better; for their tap roots naturally run downward.

When all things are ready for planting, fill up the holes with the mould before thrown out of them, if it be naturally good, after having firſt broke it fine with a ſpade: but if the ſame earth be not rich enough make uſe of fine freſh mould, or of the compoſt provided for this purpoſe. About a peck or two of this will be ſufficient for each hill; but no new dung ſhould be put into the hole on any account.

Then, with a dibble, or ſetting ſtick, ſuch as gardeners generally uſe for planting of beans, make five or ſix holes, the depth of your ſets, one in the middle, perpendicular, and the reſt round about, ſloping and meeting at the top near the center: put your ſets therein, ſo that they may ſtand even with the ſurface of the ground; and then preſs the

the mould close to them, and cover them with fine mould two or three inches thick. A ſtick ſhould be placed on each ſide of the hill to ſecure it.

The ground being thus planted, all that is to be done in the following ſummer, is to keep the hills and alleys clear from weeds by frequent hoeings; to dig the ground in the month of May, and to carry off all the ſtones that are turned up by digging; to raiſe a ſmall hill about the plants; to throw ſome fine mould on their roots; and, in the latter end of May, or beginning of June, to twiſt all the vines and branches together into a bunch or looſe knot, and lay them thus twiſted on the top of the hill.

Towards the latter end of February, or in the beginning of March, in the ſecond year, when the weather is kindly, open the hills, and with a ſharp knife, cut off the ſhoots of the firſt year to within an inch of the old ſtock, together with all the younger ſuckers that have ſprung from the ſets, and cover the ſtock with fine earth. To keep the knife ſharp, you ſhould have a whetſtone always by you at dreſſing.

In the third and following years, when you dig your hop-ground in February, let the earth be taken away with a ſpade or hoe, round about the hill, very near them, that you may the more conveniently come at the ſtock to cut it: then in fair weather, towards the beginning of March, if your hops be weak, begin to dreſs them; but if they are ſtrong, and in heart, the middle or latter end of March will be the beſt time; for late dreſſing reſtrains their too early ſpringing, which is the cauſe of many injuries to the hop.

After the hops are dreſſed in the ſecond year, the next buſineſs is to pole them. Poles of only ten or twelve feet long will do then; but in the third year, by which time they come to their full bearing ſtate, they will require poles of full ſize: this, if the ground be rich, and the hop vigorous, will be from ſixteen to twenty feet, or even more; or there will be danger of loſing great part of the crop.

If the hop be weak, and the ground not rich, the poles ſhould not be more than from fourteen to eighteen feet long for fear of impoveriſhing the root; for the hop will ſoon run itſelf out of heart if over poled; ſo that, as was ſaid before, there is more danger in over poling than in under poling; neither can a good crop be expected from an over poled ground, becauſe the branches which bear the hops grow very little till the buds have over-reached the poles, which they cannot do when the pole is too long. Two ſmall poles are ſufficient for a hill in a young ground.

Towards the latter end of July hops begin to bloſſom, about the beginning of Auguſt they bell, and in forward years, they are ſometimes ripe at the end of Auguſt, or beginning of September. When they begin to change colour, or are eaſily pulled to pieces, when they emit a fragrant ſmell, and when their ſeeds begin to look brown and to grow hard, you may conclude that they are ripe: then pick them with all expedition; for a ſtorm of wind will do them great miſchief at this time; and hops picked green and bright, without bruiſing or diſcolouring, will ſell for a third part more than thoſe that are otherwiſe.

When the poles are drawn up in order to be picked, the vines around them ſhould be cut aſunder, at the height of about three or four feet from the ground; for the cutting of them lower, eſpecially while the hops are green, would occaſion ſo great a flowing of the ſap, as would weaken and hurt the root.

The moſt convenient way of picking them is into a long ſquare frame of wood, called a bin. This frame is made of two poles, or pieces of wood, each nine or ten feet long; and three or four inches broad, joined together at about a foot and a half from each end, by two other pieces three feet long; and it is ſupported by four legs three feet and a half high; ſo that there remain in the middle of it a ſpace ſix feet long, three wide, and three and a half deep. In this ſpace is fixed a coarſe linen cloth, or hop-bag, cut open on one ſide, and hung hollow, either by hatching it on tenter-hooks along the inſide of the frame, or by ſtretching it on the outſide with wooden ſkewers, to receive the hops as they are picked. Three men or women, or four boys or girls, may ſtand on each ſide of the frame, and pick two poles at a time.

When you have raiſed ſome poles, bring them with the hops and vines on them, and lay them lengthwiſe upon the frames; or erect a forked prop at each end of the frame, and reſt the poles thereon, in order to their being picked. There is no occaſion to ſtrip the vines from the poles in order to their being picked. The workmen who raiſes the poles generally carry them to the frames, and the latter being very light, may be eaſily removed from one part of the ground to another.

The ripeſt hops ſhould be firſt picked: but if the hops appear to be equally ripe in all parts of the plantation, it is beſt to begin to pick them on the eaſt or north-ſide of the ground, the more effectually to guard againſt the ſouth-weſt wind's breaking into the garden.

Having choſen a ſpot of ground which contains eleven hills, place the bin upon the hill which is in the center, and after theſe are picked, remove it into another ſpot of the ſame extent, and ſo proceed till the whole is finiſhed.

The hops ſhould be picked as free as poſſible from leaves and ſtalks; for theſe would be of greater prejudice to the ſale, than any ſeeming advantage which might be expected from their weight. The bin ſhould be emptied two or three times a day into a large cloth of coarſe linen, in which the hops ſhould be immediately ſtitched up with ſkewers, and carried directly to the oaſt, or kiln, to be dried: for if they remain long in the bin, or cloth, they will ſweat and be diſcoloured.

If any brown hops are met with in the picking, care ſhould be taken to ſeparate them from the reſt, by putting them into a baſket by themſelves.

If the weather be very hot, or rainy, cut no more hops than may be picked in an hour: but, if it be poſſible, gather them in fair weather only, and when they are dry; for this precaution will ſave ſome expence of coals, and contribute to the better preſervation of the colour when they are dried. No hops ſhould be gathered when the dew is on them, for that would make them become mouldy.

When you have taken the poles from the hills, twiſt together the remaining ends of the binds, that they may not get among people's legs, and hinder their work.

Before you draw the poles, obſerve whether the hops of one pole be entangled above with thoſe of another, and if they are, cut them aſunder with a ſharp hook fixed at the end of a long pole.

If the garden be large, it may be worth while to raiſe a ſhed in the midſt of it, to ſhelter the pickers and the

hops

hops from the ſun and rain; and to lay hops in overnight, to be picked early the next morning before the dew is off the other hops. This ſhed will alſo ſerve for preſerving your poles in winter.

If there be either rain or dew upon the hops at the time when they muſt be gathered, ſhake the pole, and they will dry the ſooner. If they are over-ripe when gathered, they will ſhed their ſeeds in which the chief ſtrength of the hop conſiſts; nor will they then look ſo green, but ſomewhat brown, which is a great diminution of their value. It therefore is better to pull the hops, a little before they are ripe, than to wait till they are full ripe. Four pounds of undried hops, thorough ripe, will make one pound of dry; and five pounds of hops ſcarcely ripe, though in their full prime, will make no more when they are dried.

There are two principal ſorts of hops, viz. the green and the brown. The former yields by much the beſt colour when dried, and the other is the moſt plentiful bearer.

Brown hops are fit for brown ale, but the hops for fine pale beer muſt be green; for which reaſon theſe laſt are moſt eſteemed.

As faſt as you pick hops, dry them on a kiln; otherwiſe they will change colour: but if you cannot dry them immediately, and muſt keep them a little while, ſpread them on a floor, and by that means the damage which they will receive in a day or two will not be great.

They who have five or ſix acres of hops, may employ ten frames at a time in picking.

If any of the rath-ripe, or early hops, which bloſſom and ripen a week or ten days ſooner than the other ſorts, happen to be intermixed in the ſame plantation, they ſhould be watched carefully, in order to their being gathered in time; for if they hang till they are over ripe, they will ſhed their ſeeds, turn brown, and thereby not only become bad themſelves, but ſpoil the ſale of the others with which they are mixed. It is therefore adviſable to mark at the bloſſoming ſeaſon, the hills in which they are, in order to dig them up and replant thoſe ſpots, for the trouble of pulling them up ſeparately, when they are ſcattered here and there in a hop-ground, and of carrying them, ſometimes a conſiderable way, to a convenient place, to be picked, is very great, and cannot be avoided otherwiſe than by either baniſhing them totally, which would not be quite conſiſtent with the huſbandman's profit, as they fetch a good price by their coming firſt to market; or, which is the beſt way, by planting them in a garden by themſelves.

Very particular care ſhould be taken that the hops be thoroughly and equally dried. In this lies the greateſt difficulty in the art and management of them: for if they are over-dried, they will change colour, look brown, and be judged to be burnt, whereby their value will be greatly diminiſhed; and if they be under-dried, they will loſe their colour and flavour. Experience has ſhewn, that an handful only of under-dried hops will ſpoil many pounds of others, by taking away their fine ſmell and colour.

The beſt way of drying them is with a charcoal fire, on a kiln covered with hair-cloth, of the ſame form and faſhion as is uſed for drying of malt, under which head this common ſort of kiln will be more particularly ſpoken of hereafter. It is found to ſuffice in places where only a few hops are raiſed, and a great deal of malt is made: but where the hop-planters have a much greater quantity of hops than can be dried in due time on their malt-kiln, (for hops, as was ſaid before, ought to be dried as ſoon as poſſible after they are picked) they build, in the following manner, ſeveral ſmall kilns on purpoſe for drying of hops.

Eight or ten acres of hop-ground require a building of about ſixty feet long, and fifteen wide in the clear. At one end of this building is a boarded room, to receive the green hops which are brought from the hop-ground, and which lie ſpread out there till there be room to put them on the kilns: at the end of the building is another large boarded room, for receiving the hops from the kiln when they are dried, and for them to lie in heaps to ſweat till they are fit for bagging. In the intermediate part of the building, three or four kilns, of eight or ten feet ſquare each, are conſtructed thus, cloſe to one another.

If the middle building is, we will ſuppoſe, twenty-eight feet long, and fifteen feet wide, there will be room for three kilns of eight feet ſquare each on the clear, and for their reſpective walls. Theſe kilns ſhould lie in a line along the back wall, and will come forward above nine feet; ſo that there will remain a paſſage five feet wide and twenty-eight feet long at the front of their kilns.

To form each kiln, build the walls of brick, nine inches thick, and let each of the four ſides be eight feet long in the clear, and ſeven feet high. The principal parts of the kiln are, in the upper part, the bed or floor whereon the hops are to be laid in order to their being dried; and in the under part, the furnace, ſteddle, or lanthorn, for the fire. The bed or floor in a kiln of eight feet ſquare, ſhould be about ſix feet from the lower floor, ſo that it will be about a foot below the top of the wall. This foot of wall riſing above the bed, ſerves to keep in the hops on the kiln, and for men to walk upon round about the kiln, to look to the drying of the hops. The bed, or floor, may be made of wooden rails an inch ſquare, laid very even and level, into a croſs beam, a quarter of an inch aſunder: or if the kiln be arched below, the floor may be laid with long bricks, or ſtones reſting on the tops of the arches, at about two inches diſtance from each other.

In making the lower part of the kiln, place the mouth of the furnace at the bottom, in the middle of the front wall of the kiln, and let it be fourteen inches wide and ſixteen high. Joining to the mouth of the furnace on the inſide, build the ſteddle or lanthorn, of brick, four inches thick. This lanthorn ſhould be fourteen or ſixteen inches wide, three feet perpendicularly high in the ſide walls, and it ſhould reach from the front wall of the kiln to within a foot and an half of the back wall, ſo that there will be room for a man to paſs between it and the back wall, and the length of the lanthorn thus made will be about ſix feet. On its ſide walls, bricks of a foot length are to be raiſed on their ends, leaning to and bearing upon one another, ſo as to form a covering like the roof of a houſe; or the top of the lanthorn may be regularly arched over.

In building the ſide walls of the lanthorn, after you have laid the two firſt rows of brick, leave at the end of every brick in the three or four following rows, an open ſpace or hole, four or five inches wide, checquer-wiſe, both in the ſides and in the back, and lay the uppermoſt row or two of bricks cloſe together, as in the bottom rows, for the better ſupport of the roof. By this means there will be three or four rows of holes, which are deſigned to convey the heat equally to all parts under the hair-cloth. The roof ſhould be well plaiſtered on the inſide with hair and lime, that it may the better reflect the heat.

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In the front-part of the kiln, on one ſide of the furnace, and at the height of two feet from the ground, a ſmall door ſhould be made, three feet high, and two wide, ſo that a man may eaſily get in to ſet every thing to rights about the ſteddle. There ſhould alſo be ſteps or ſtairs to go to the upper floor, where the hops are dried; and as there is a paſſage below, five feet wide, along the front of the kilns; ſo will there be, directly over head on the upper floor, a like paſſage, which will be of uſe for bringing green hops from their room, and laying them on the kiln, and for carrying them to the ſtore-room after they are dried. For greater conveniency, both theſe rooms ſhould be on the ſame floor as the upper-part of the kiln.

A farther caution neceſſary to be obſerved, is that no holes be made within a foot of the fire-place or mouth of the furnace, and that all the parts about the kiln be conſtructed ſo cloſe that no wind or air may poſſible get in. The farther end of the ſteddle ſhould be built of brick up to the top, with holes in it, as in the ſides.

The kiln ſhould be ſquare, and may be ten, twelve, or fourteen feet over at the top; but there ſhould be a due proportion between the height and breadth of the kiln, and the ſize of the ſteddle where the fire is kept, viz. if the kiln be twelve feet ſquare on the top, it ſhould be nine feet high from the fire, and the ſteddle ſhould be ſix feet and an half ſquare; and ſo proportionably in other dimenſions. Theſe kilns are made at a ſmall expence.

In drying of hops, firſt lay the hair-cloth very even on the bed or floor of the kiln, and ſpread the green hops thereon, about ſix inches thick, laying them with a rake as ſmooth as poſſible, not thicker in one place than another. Let the kiln be moderately warmed before you lay on the hops; then keep an even and ſteady fire under them, but not too fierce at firſt, for fear of ſcorching them; and let not the fire ſlacken, but rather increaſe it till the hops are nearly dried, leſt the moiſture or ſweat, which the fire has raiſed, fall back and diſcolour the hops. For theſe reaſons chiefly it is, that no cool air ſhould be ſuffered to come into the kiln while the hops are drying, and that wind, which would make the fire burn too vicilently, ſhould not be permitted to blow on the mouth of the furnace. After the hops have lain thus about ſeven, eight, or nine hours, having leſt off ſweating, and leap up when beaten with a ſtick, then turn them upſide down with a broad malt-ſhovel, or ſcoop made for that purpoſe, or caſt them up into a heap in the middle, and afterwards ſpread them equally on all ſides. Let them remain in this ſituation for two or three hours more, till every hop, if poſſible, be thoroughly and equally dried; and then with a hair-cloth, remove them to the heap where they are to lie till they are bagged. If they do not dry in one place ſo much as in the reſt, which may be perceived by touching them with a ſtick or wand, and obſerving whether they rattle when ſo touched, as they will do when dry; make them thinner in the places where they rattle leaſt. They muſt not be turned while they ſweat; for that will burn them, and make them loſe their colour. The fire may be diminiſhed a little before they are turned, and refreſhed again afterwards: but thoſe times excepted, the heat ſhould be kept as equal as poſſible.

Hops are fully dried when their inner ſtalks become brittle and break ſhort on rubbing, and when their leaves fall off eaſily, and feel very criſp. When they crackle and leap a little, as they will do upon the burſting of their ſeed, then is the time to take them off the kiln.

If the fuel uſed for this purpoſe be either wood or turf, it ſhould be charred firſt, becauſe ſmoke ſpoils the colour and ſmell of hops. Charcoal made of old rotten poles is moſt commonly uſed. Cinders of ſea-coal are alſo very good; and it is found by experiencs that Kilkenny coal dries hops perfectly well, becauſe it does not ſmoke, and gives a conſtant uniform heat for a long time. The fire ſhould be made at the mouth only of the furnace; for the air will diſperſe the heat ſufficiently from thence to all parts of the kiln: and that it may be conſtantly of the ſame gentle degree, neither too ſtrong nor too weak, it may be of ſervice to make uſe of a thermomenter, by marking upon which the degree of heat proper for drying hops, as ſoon as that degree is aſcertained by experiment, you may always after know how to regulate your fire with great exactneſs: for, putting the thermometer within ſide the kiln for a ſhort time, you may obſerve, by the height of the liquor, when the heat is come to a right pitch, and when it is either too high or too low, and ſo increaſe or ſlacken the fire accordingly. Any ſervant may, with the help of this inſtrument, be able to mend and correct the fire with great certainty, and not be liable to commit miſtakes, which often prove exceedingly detrimental to the hops. When you begin drying, loſe no time in the proſecution of that work, but employ people night and day, to attend it with the utmoſt care, till it be finiſhed. A large malt-ſhovel full of charcoal, thrown into the mouth of the furnace of a kiln eight feet ſquare, will laſt an hour.

It is obſerved that hops dried in the ſun loſe their richneſs of flavour, as other herbs do when they are dried that way. If they are laid on a floor to dry, without uſing a fire, they will loſe their ſtrength, be apt to ſweat or ferment upon change of weather, and not be fit for packing. Fire exhales their watery parts, and, by retaining the oily, preſerves their flavour and colour.

Hops break all to powder if they are bagged hot from the kiln. To prevent this, they ſhould be laid in a heap, to ſweat and grow tough: and if they are then covered for a while cloſe with blankets, to keep the air from them, they will bag the better. There is no limited time for their ſweating, that varying according to the weather: three or four days are commonly ſufficient; but it is a certain rule, that when the hops feel moiſt and clammy, and can be ſqueezed in the hand, or trodden cloſe, without breaking, they are then fit for bagging. The harder they are trodden, the better they will keep.

The bags proper for this occaſion are made of coarſe linen cloth. They are commonly about eleven feet long, and near two yards and a half in circumference, and contain about two hundred and a half weight of hops. The ſmall bags, called pockets, contain about half that weight.

The manner of bagging is thus: make a round or a ſquare hole, but a round one is moſt convenient, about twenty-ſix or thirty inches over, in the floor of the chamber where the hops are laid in heaps after they are ſweated. This hole ſhould be large enough to receive the bag, and for a man to go up and down it with eaſe. Tie with a piece of packthread, an handful of hops in each lower corner of the bag, to ſerve as handles for the more eaſy lifting or removing of the bag; and, with packthread, faſten the mouth of the bag to a frame, or hoop, ſomewhat larger than the mouth of the hole, that the hoop

may reſt on its edges, and ſtrong enough to bear the weight of the hops when the bag is full, and of the man who treads them. The upper part of the bag being thus fixed by the hoop, let the reſt of it hang down through the hole; but not ſo near to the lower floor as to touch the ground: then throw into it a buſhel or two of hops, and let a man go into the bag, and with ſhoes that have no heels, tread the hops down on every ſide, as hard as he can, till they lie cloſe. Let more hops be then caſt into the bag, and be trodden down as before; and continue this till the bag is full. When that is done, untie it from the hoop, let it down, and ſew up its mouth as cloſe as you can, obſerving at the ſame time to tie up ſome hops in the upper corners, as was done before in the lower. The harder the hops are preſſed, and the cloſer and thicker the bag is, the longer and better the hops will keep.

When they are thus bagged, lay them upon a boarded floor, and in a dry place; for dampneſs would injure them greatly. At the ſame time all proper meaſures muſt be taken to guard againſt rats and mice, which, though they do not eat hops, are very apt to ſpoil them, by making neſts and lodging in them.

Some, in treading the hops, uſe a fifty pound weight, faſtened to a rope, and placed in the middle of the bag. The man in the bag treads about with his feet, and lifts it up now and then, to preſs them the cloſer together.

As ſoon as the hops are picked, ſtrip their haulm or vines from off the poles, and, as your laſt work, lay the poles up ſo that they may be preſerved. This is done either by ſtacking, piling, or houſing.

The ſtacking is performed thus: ſet up three poles, like an erect triangle, or rather ſix poles, let into the ground with an iron crow, and placed circularly, but inclining to one another ſo as to meet, and be tied faſt together with bands of the haulm of the hops, within a yard of the top. The poles deſtined for the ſame ſtack ſhould then be erected ſpeedily againſt this frame; for if they are ſuffered to lie on the ground, eſpecially in wet weather, they will receive more damage in a fortnight, than by their ſtanding out upright all the reſt of the year. When they are ſet up, about three hundred to a ſtack, bind them round with a rope of twiſted haulm, to keep them together. By this means the outer poles only are ſubject to the injuries of the weather, and keep all the inner ones dry, excepting at their tops and bottoms, the former of which are for the moſt part expoſed to the air, as the latter are to the moiſture of the earth. It is therefore a good method to cover the top of the ſtacks of poles with haulm, and to lay ſtones, bricks, or ſand, at their bottom, to preſerve their butends from rotting.

Many chuſe to pile them up lengthwiſe, in different parts of the hop ground, laying three or four old poles athwart at bottom, to preſerve them from the dampneſs of the earth, and ſetting ſeveral poles erect in the ground on each ſide of the pile to prevent its ſlipping: they then lay the poles on one another, placing the ſmaller ends inwards, and the bigger outward; ſo that the pile ſhould conſequently be ſomewhat longer than the poles: and when it is raiſed high enough, they bind it acroſs with ropes of twiſted haulm, to keep it upright and ſteady, and then cover it with haulm, to defend the poles from rain. This is a better method than the former; but the beſt way of all to preſerve the poles, is to build in the hop ground a ſhed or two, which may ſerve as a ſhelter for picking the hops in ſummer, and laying up the poles in winter, with leaſt danger of their being hurt or ſtolen.

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The management of the hop ground during the third and every ſubſequent year (for it will continue to yield good crops during upwards of twenty years, if it be rightly cultivated) is the time as above directed; ſo that it will require pretty conſtant care and attendance, eſpecially from the beginning of March to the end of September. This you may lay down as a certain rule, that the more pains you take, and the greater expence you are at, in the due culture of the ground, and management of the hops, the greater will be your profit.

The charge of an acre of hop ground, in moſt parts of England where hops are cultivated, is computed thus: three pounds for the huſbandry, four pounds for the wear of the poles, five pounds for picking and drying, one pound ten ſhillings for dung, one pound for rent, and ten ſhillings for tythe; in all, fifteen pounds a year: but in ſome places they pay four or five pounds an acre yearly for the rent of the land.

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The hop planters in England reckon, that they have but a moderate return when the produce of an acre of hops does not ſell for more than thirty pounds. They frequently have fifty, ſixty, eighty, or an hundred pounds for an acre; nay, ſome have got conſiderably more than even this laſt ſum for every acre of hops, at a time when the crops of other hop grounds have failed in general, and theirs have ſucceeded. But if, on one hand, ſuch extraordinary profit, being very uncertain, is not to be depended upon; ſo, on the other, it ſhould not be paſſed over quite unnoticed, becauſe it is among the chances which may make amends for failing years. Upon the whole, if the total charge of an acre of hops is computed as above, at fifteen pounds a year, and its produce, at an average of years, at thirty pounds only, the clear profit from an acre will be fifteen pounds a year.

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"On the 27th of June ſome ſpecks of fen appeared. From this day to the 9th of July the weather was very dry. At this time, when it was ſaid that the hops in moſt parts of the kingdom looked black and ſickly, and ſeemed paſt recovery, ours held out pretty well, in the opinion of the moſt ſkilful planters. The great leaves were indeed diſcoloured, and a little withered, and the fen was ſomewhat increaſed.

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"About the middle of Auguſt the vines had done growing both in ſtem and branch, and the forwardeſt began to be in hop, the reſt in bloom; the fen continued ſpreading where it was not before perceived; and not only the leaves, but many of the burs alſo were tainted with it.

About the 20th of Auguſt, ſome of the hops were infected with the fen, and the whole branches were corrupted by it. Half the plantations had eſcaped pretty

may reſt on its edges, and ſtrong enough to bear the weight of the hops when the bag is full, and of the man who treads them. The upper part of the bag being thus fixed by the hoop, let the reſt of it hang down through the hole; but not ſo near to the lower floor as to touch the ground: then throw into it a buſhel or two of hops, and let a man go into the bag, and with ſhoes that have no heels, tread the hops down on every ſide, as hard as he can, till they lie cloſe. Let more hops be then caſt into the bag, and be trodden down as before; and continue this till the bag is full. When that is done, untie it from the hoop, let it down, and ſew up its mouth as cloſe as you can, obſerving at the ſame time to tie up ſome hops in the upper corners, as was done before in the lower. The harder the hops are preſſed, and the cloſer and thicker the bag is, the longer and better the hops will keep.

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"On the 27th of June ſome ſpecks of fen appeared. From this day to the 9th of July the weather was very dry. At this time, when it was ſaid that the hops in moſt parts of the kingdom looked black and ſickly, and ſeemed paſt recovery, ours held out pretty well, in the opinion of the moſt ſkilful planters. The great leaves were indeed diſcoloured, and a little withered, and the fen was ſomewhat increaſed.

"From the 9th of July to the 23d, the fen increaſed a great deal; but the flies and lice decreaſed, it raining much daily. In a week more, the fen, which ſeemed to be almoſt at a ſtand, was conſiderably increaſed, eſpecially in thoſe lands where it firſt appeared.

"About the middle of Auguſt the vines had done growing both in ſtem and branch, and the forwardeſt began to be in hop, the reſt in bloom; the fen continued ſpreading where it was not before perceived; and not only the leaves, but many of the burs alſo were tainted with it.

About the 20th of Auguſt, ſome of the hops were infected with the fen, and the whole branches were corrupted by it. Half the plantations had eſcaped pretty

well hitherto, and from this time the fen increaſed but little: but ſeveral days of wind and rain in the following week diſtorted the plants ſo that many of them began to dwindle, and at laſt came to nothing; and of thoſe which then remained in bloom ſome never turned to hops, whilſt many of thoſe which did were ſo ſmall, that they ſcarcely exceeded the ſize of a good large bur.

"We did not begin to pick till the 8th of September, which is eighteen days later than we began before. The crop was little above two hundred on an acre of ground, and not good. The beſt hops ſold this year at Way-hill, for ſixteen pounds the hundred."

As a farther means of inveſtigating the cauſe of this pernicious diſtemper, Dr. Hales relates the following experiment, which he himſelf made on hops. In the month of July, he cut off two thriving hop vines, near to the ground, in a thick ſhady part of the garden, and left the pole ſtill ſtanding. He ſtripped the leaves from off one of theſe vines, and left them on the other, and then ſet their ſtems in known quantities of water in little bottles. That with leaves imbibed in a twelve hours day, four ounces, and that without leaves only three fourths of one ounce.

He took another hop-pole with its vines on it; and having carried it out of the hop-ground into a free and open expoſure, theſe plants imbibed and perſpired there double the quantity of the before-mentioned which had leaves on it, in the hop-ground. This ſeems to indicate that the reaſon why the hop vines on the outſide of gardens, where they are moſt expoſed to the air, are ſhort and poor, in compariſon of thoſe in the middle of the ground, is, becauſe, being much drier there, their fibres harden ſooner, and therefore they cannot grow ſo kindly as thoſe in the middle of the ground, which, by the ſhade and ſhelter they afford each other, are always kept moiſter and more ductile.

From this perſpiration of their fluid, the ſame attentive obſerver of nature forms the following calculation. There being a thouſand hills in an acre of hop-ground, and each hill having three poles, and each pole three vines, the number of vines will be 9000, each of which perſpiring four ounces, the ſum of all the ounces perſpired by an acre in twelve hours of day will be 36000, equal 15750000 grains, equal 62007 cubic inches, or 220 gallons, which being divided by 6272640, the number of ſquare inches in an acre, it will be found, that the quantity of liquor perſpired by all the hop-vines will be equal to an area of liquor as broad as an acre, and $\frac{1}{101}$ part of an inch deep, beſides what is evaporated from the earth.

Now this quantity of moiſture, in a kindly ſtate of the air, if daily carried off, is ſufficient to keep the hops in a healthy ſtate: but in a rainy moiſt ſtate of air, without a due mixture of dry weather, too much moiſture hovers about the hops, ſo as to hinder, in ſome meaſure, the kindly perſpiration of the leaves, whereby the ſtagnating ſap corrupts, and breeds mouldy fen, which often ſpoils whole tracts of, till then, flouriſhing hop-grounds.

This was the caſe in the year 1723, when, for twelve or fourteen days, almoſt continual rains fell, about the latter half of July, after four months of dry weather; upon which the moſt flouriſhing and promiſing hops were all infected with mould, or fen, in their leaves and fruit, while the then poor and unpromiſing hops eſcaped, and produced plenty, becauſe they, being ſmall, did not perſpire ſo great a quantity as others, nor did they confine the perſpired vapour ſo much as the large thriving vines did in their ſhady thickets.

The planters of hops remark, that when a mould, or fen, has once got poſſeſſion of any part of the ground, it ſoon over-runs the whole, and that even the graſs, and other herbs under the hops, are infected with it. The reaſon probably is, that the exceeding ſmall ſeeds of this quick growing mould, or moſs (for ſuch in fact it is) coming ſoon to maturity, are eaſily blown over the whole ground; and it is undoubtedly owing to the ſame cauſe, viz. to the remaining diſperſed ſeeds of the preceding year's fen, that ſome grounds are infeſted with this diſtemper for ſeveral years running. The means pointed out for curing the moſs on fruit-trees ſhould therefore be aſſiduouſly recurred to here, at leaſt ſo far as they can be applied to hops; and, at all events, particular care ſhould be taken to keep the land always in fine tilth, conſtantly free from weeds, and to burn all the fenny hop-vines, in a place remote from the garden, as ſoon as they are picked. We have already ſeen inſtances of the cure of moſs upon fruit-trees, by the uſe of hog's dung; and there is no room to doubt the efficacy of the ſame remedy when applied to mouldy, or moſſy hops.

Mr. Auſten, of Canterbury, obſerves that the fen is more fatal to thoſe grounds which lie low, and are cloſely ſheltered, than to ſuch as have a high, and open ſituation; to thoſe that lie ſhelving to the north, more than to thoſe whoſe ſlope is towards the ſouth; to the middle of hop-grounds, more than to moiſt and ſtiff ſoils. This was very apparent throughout his plantations, where the land was prepared and planted in the ſame manner, and at the ſame time.

The mildew, which lights upon hops, is a white dew, that falls in ſummer at ſun-riſe, chiefly when the hops are in flower. Its fall is ſo unequal, that it ſometimes embraces a whole diſtrict, and ſometimes only parts of it. This dew dries up the hops, withers and conſumes their leaves, and conſequently ruins the crop. "There is," ſay the authors of the Journal Oeconomique, whoſe account of this diſtemper, to which hops are extremely liable, we ſhall copy here, "no other remedy from nature againſt this miſchance, except rain ſufficient to waſh the plant, and clear it entirely from this fatal dew: but as rain ſeldom comes quite ſeaſonably to the relief of the plant thus affected, artificial means have been ſought, for inſuring it againſt this accident. Some have ſurrounded their hop-grounds with hogs-dung; others have employed perſons to go through the ground with veſſels full of beech-aſhes, and to throw them upon the hops while the mildew was falling; and both ſides, profiting by their experience, pretend to have found a ſpecific preſervative againſt the bad effects of the mildew. They have even proceeded ſo far as that each ſide affirm their's to be the only remedy. Thoſe who uſe hog-dung ſay, that the aſhes may probably hinder the action of the dew upon the plant; but that they muſt, at the ſame time, ſtop up its pores, and deprive the ſoil of its humidity; a circumſtance equally ruinous to the plant: and that, beſides, beech is not to be found every where, and if it muſt be brought from afar, the remedy would in ſome meaſure become impracticable, by the ſcarcity and difficulty of procuring it. The partizans of the aſhes ſay, that they cannot comprehend how hog-dung laid round the hop-ground in the ſpring, ſhould preſerve ſuch virtue as to deſtroy the bad quality of this mildew in the ſummer. In ſhort, to render this diſcuſſion complete,

complete, each ſide alledges, that the trials which they have made of the other's remedy did not ſucceed.

"This diſpute, the ſubject of which is highly intereſting to all countries where beer is the common drink, excited a naturaliſt to examine the nature of this mildew; and with the aſſiſtance of a microſcope he perceived it to be full of the eggs of little inſects, which fly in vaſt numbers in the air while the hop is in bloſſom. Theſe inſects gnaw the leaves even of trees, and, like others of their ſpecies, undergo various metamorphoſes. This diſcovery induced him to believe, that, as inſects are not apt to attack perfectly healthy trees, or vigorous plants, but only ſuch as are feeble and ſickly (they being endued with ſuch nice ſenſations as to diſtinguiſh by the outſide only, perhaps by the ſmell, a plant which is vitiated within, though it may appear to us to be quite fair and ſound) hog-dung might probably give ſuch vigour to the hop, as to render theſe little animals afraid to attack it: for it has been remarked, that the inſects which nip a leaf, leave it as ſoon as they find in it an abundant juice, the ſalts of which, it may be preſumed, are too ſtrong for them; and that they fix on thoſe only which begin to decay and loſe their ſap. Aſhes may likewiſe have the power of hurting them, and its ſalts may be capable of giving them diſturbance. But late experience hinders us from giving entire credit to theſe two remedies, and ſhews, that if they have ſometimes preſerved hops from the effects of mildew, we are not to conclude that they will always anſwer this deſirable end.

"A very good huſbandman ſaw his hops ſpoiled by the mildew, notwithſtanding the dung with which they were ſurrounded, and the aſhes that were thrown upon them: in a little time the leaves of the plants were covered with millions of ſmall white inſects. The aſhes, indeed, ſeemed to kill them; but, as was obſerved above, they at the ſame time deprived the ſoil of its neceſſary moiſture. Deſirous of ſaving his hops, he recollected an axiom in medicine, importing, that bitter things kill worms: *amarum necat vermes.* He then ordered a quantity of wormwood to be bruiſed; and having infuſed it in water, he ſprinkled his hops with the infuſion, by means of a forcing pump; but he was too late, the hops being already deſtroyed. A clergyman in his neighbourhood, who was well verſed in matters of agriculture, and to whom he related his bad ſucceſs, anſwered, that when ſuch an accident happened to him, he, without giving himſelf ſo much trouble, ordered his people to ſtrip off immediately all the leaves of his hops, and that, the ſtalks puſhing out other leaves, he had at leaſt one half, and ſometimes two thirds, of his ordinary crop."

"The publication of the above account concerning hops," add the writers of the *Journal Oeconomique* (whom we continue to copy) in one of their ſubſequent papers, "has excited a ſkilful farmer to communicate his experiments on this ſubject. The reader will perceive, by the following extract of his letter, which we are impatient to publiſh to the world, the obligations that are due to him from all thoſe who cultivate hops, and the credit he deſerves in what he relates.

"I was informed ſome years ago, that hogs dung might be employed to great advantage in hop gardens: nevertheleſs, as I could not conceive the reaſon of the advantage which the hops derived from that ſort of dung, I gave myſelf no trouble about uſing it preferably to any other; but having this laſt year loſt almoſt all my hops by the mildew, and having obſerved but one ſingle place where the fruit remained entire, and in a perfect ſtate, I found, upon diligent enquiry, that my ſervants had laid hogs dung upon that very ſpot, preciſely where the mildew had not injured the fruit. I am therefore convinced of the good effects of this dung in hop gardens, and the more ſo, as I am certain that my land was prepared with dung of all ſorts. The farmer will therefore find his account in uſing for his hop grounds all his hogs dung (which, it is likewiſe to be conſidered, is in general thought to be the leaſt ſerviceable to corn lands) and in covering his hop trenches, both in autumn and ſpring, with the ſame kind of dung new, before it is rotten."

The latter part of this letter is calculated for ſuch general utility, that we cannot refrain from adding it here, though at the hazard of digreſſing from the preſent ſubject. The directions given in it are indeed uncommon; but we can hardly ſuppoſe, that the writer of it would inſtance facts, without having a foundation for ſo doing.

"When hops are ſcarce, their leaves and ſprigs ought to be gathered for ſeveral uſeful purpoſes; but they muſt be gathered with great care: no leaves ſhould be taken, but ſuch as are clean, young, whole, and green; and only the tips of the ſprigs that are green, young, and full of juice. They muſt be dried in a very clean and airy place.

"Theſe may be uſed in brewing, for an after beer, or for common ſmall beer; for by throwing in the leaves and ſprigs of hops, that beer acquires additional ſtrength, becomes the more wholeſome, and will keep the longer.

"The leaves and ſprigs of hops are, during the exceſſive colds of winter, an excellent cordial to cattle, whom they ſtrengthen prodigiouſly. The method of uſing them, is to infuſe them in boiling water, and to mix this infuſion with the ordinary drink of the cattle.

"Cattle may be ſtill more ſtrengthened, by mixing with their drink the tops of pines or firs: and to render theſe the more efficacious, it is proper to boil them in a kettle, that all the reſinous ſubſtances may diſſolve, and to pour the extract into their drink. Some of my cows, then kept on a little farm, which is ſurrounded with mountains, were ſo affected by a prodigious cold, that the very marrow was almoſt frozen in their bones: they lay helpleſs upon the ground, and though the beſt of fodder was given them, could not uſe their limbs or riſe up. I can aſcribe to no other cauſe, than the remedy which I have juſt now pointed out, the ſurprizing cure of theſe animals. In one month's time, they were ſo well recovered, that they roſe without any aſſiſtance, and ever ſince they have reſiſted the moſt violent cold, without being in the leaſt affected. The ſingularity of this event determined me to impart it to you, in order that every body may, upon the like occaſion, have recourſe to the ſame remedy."

As to the fire blaſt, as it is commonly called, we ſhall only add here, what Dr. Hales had related, that, in the month of July, which is the ſeaſon when this blight is moſt apt to affect hops, he had ſeen the vines in the middle of the hop ground ſcorched up almoſt from one end of a lage plantation to another, when a hot gleam of ſun-ſhine came immediately after a ſhower of rain; and that, at ſuch times, vapours may be obſerved, with the naked eye, to aſcend ſo plentifully, as to make an object, which was before clear and diſtinct, become immediately very dim and tremulous. It was therefore probably owing

owing to the much greater quantity of vapours in the middle of the hop garden, than there was towards its ſkirts; and that middle being the denſeſt medium, the rays of the ſun may have been collected nearer to a point, by paſſing through that denſer medium, than they were in the outer parts of the ground. The courſe of the ſcorch was at right angles to the beams of the ſun about eleven o'clock, at which time the hot gleam happened. The hop ground was ſituated in a valley, running from ſouth-weſt to north eaſt; there was very little wind, and that in the courſe of the ſcorch.

HOPPER, a kind of baſket, in which the ſeed-corn is carried at the time of ſowing. *See the article* DRILL-PLOUGH.

HORN-BEAM, the name of a tree very common in many parts of England, and in ſome places cultivated for its wood, which is very hard and ſerviceable for many purpoſes, eſpecially turnery-ware, mill-cogs, &c.

HORSE, a well known quadruped, and one of the nobleſt animals we are acquainted with.

The moſt noble conqueſt ever obtained by man, was over this proud and ſpirited animal, which ſhares with him the fatigues of war, and the glories of battle. The horſe, not leſs intrepid than his maſter, ſees danger, and defies it; he inures himſelf to the din of arms; he delights in it, ſeeks it, and is animated with an ardour equal to that of man. He alſo ſhares with his maſter in the pleaſures of the chace, the courſe, and tournaments: but his docility being equal to his courage, he is not carried away by impetuoſity; but checks its impulſes, and not only ſubmits to the hand of the rider, but ſeems even willing to conſult his deſires. Ever obedient to the impreſſions he receives, he darts forward, ſlackens his pace, or ſtops, as they happen to indicate: he renounces his very being, and exiſts merely by the will of another, which he frequently anticipates, and by the celerity and preciſion of his motions, at once expreſſes and executes. He feels as much as is deſired, and performs no more than the rider pleaſes; he gives himſelf up without reſerve, and declines no ſervice; exerts all his ſtrength, and, that his obedience may be complete, will ſtrain every nerve, till he even expires under his generous efforts.

Such is the horſe, whoſe talents are improved, and his natural qualities perfected by art: from his birth he is carefully attended, exerciſed, and fitted for the ſervice of man: his education commences with the loſs of his liberty, and is completed by reſtraint. The ſervitude of theſe animals is ſo univerſal and perpetual, that we ſeldom ſee them in their natural ſtate. When employed, they are loaded with harneſs; in the ſeaſons of reſt, they are not entirely free from ſhackles, and even in the fields and paſtures, they carry the badges of ſlavery, and frequently bear the cruel marks of labour and pain. Their mouths diſfigured with furrows, occaſioned by the bit; their ſides deformed with ulcers or cicatrices from the ſpur; their hooſs perforated with nails, and their attitudes, by the continued preſſures of the harneſs, cramped and conſtrained; even thoſe, whoſe ſervitude is of the eaſieſt kind, being kept chiefly for ſhew and magnificence, and whoſe gilded chains are not ſo much intended for an ornament to them, as to diſplay the opulence of their maſter, are ſtill more diſgraced by the elegance of their foretop, the plaiting of their manes, the gold and ſilken capariſons with which they are adorned, than by the iron faſtened to their feet.

Nature is more elegant than art; and in an animated being, the freedom of motion conſtitutes the beauty of nature. Obſerve thoſe horſes in the American dominions of Spain, where they enjoy all the ſweets of liberty; how elegant in their attitudes, their running and leaping! Free from all reſtraint and ſtiffneſs, they are proud of their independence; they fly from man, and diſdain his care; they ſeek and find themſelves proper food; they range and friſk at liberty in immenſe paſtures, cropping the freſh product of a perpetual ſpring. No ſettled abode, no other ſhelter than the canopy of a ſerene ſky, they breathe a purer air than in thoſe vaulted palaces where we confine them in narrow ſpaces. Accordingly theſe wild horſes excel moſt of their ſpecies in ſtrength, fleetneſs, and vigour. In them ſpirit and dignity are the gifts of nature; the other poſſeſs only the gifts of art, viz. ſkill and gracefulneſs.

The nature of theſe animals is not ferocious, they are only wild and ſpirited. Though ſuperior in ſtrength, they never moleſt other animals; and if moleſted themſelves, they deſpiſe, diſperſe, or trample upon the aggreſſor. They are attached to each other, and herd together; not through fear, but from a natural love of ſociety. Graſs and vegetables being all they deſire, a ſufficiency of food is never wanting; and not being carnivorous, they have no wars either with other animals, or among themſelves. They never diſpute about ſubſiſtence, never contend with one another for prey or booty, the uſual cauſes of quarrels and battles among carnivorous animals. Thus they live in peace; every individual has enough, and their appetites being ſimple and moderate, they never envy each other.

All theſe particulars may be obſerved in young horſes brought up together; their diſpoſitions are mild and gentle, the ſocial qualities are ſeen in them, and their ſtrength and mettle are conſpicuous only in acts of emulation. They ſtrive to excel in ſpeed, and to accuſtom themſelves to danger: they defy each other to croſs a river, or leap a ditch; and thoſe which, in theſe natural exerciſes, ſet the example, thoſe which voluntarily lead the way, are always the beſt, the moſt generous, and often, when tamed, the moſt docile and tractable.

Some antient authors mention wild horſes, and even the places where they were found. Herodotus obſerves, that on the banks of the Hypanis in Scythia, were wild white horſes; and he deſcribes others in the northern parts of Thrace, beyond the Danube, cloathed with hair five inches in length. Ariſtotle mentions Syria; Pliny, the northern countries; Strabo, the Alps and Spain, as countries that produced wild horſes. Among the moderns, Cardan ſays the ſame of Scotland and the Orkneys; Olaus of Muſcovy; Dapper of the iſle of Cyprus, adding, that its wild horſes were remarkable for their beauty, ſwiftneſs and ſtrength; Struys of the iſle of May, where there is a breed of wild horſes extremely ſmall. Leo Africanus relates, that wild horſes were found in the deſarts of Africa and Arabia; and affirms, that he himſelf ſaw, in the waſtes of Numidia, a white colt with a frizzled mane. Marmol confirms this account, and obſerves that in the deſarts of Arabia and Lybia, theſe animals are ſmall, of an aſh colour, and ſome of them white, with ſhort briſtled manes; and that neither dogs nor tame horſes can equal them in fleetneſs. The *Lettres Edifiantes* mention very ſmall wild horſes in China.

All

All parts of Europe being at preſent inhabited, and almoſt equally peopled, wild horſes are no longer to be found in it; and thoſe in America came originaly from tame horſes bred in Europe, and carried over thither by the Spaniards, where they have ſince multiplied in the vaſt tracts of that uninhabited country; for this ſpecies of animals were wanting in the new world. The amazement and terror of the inhabitants of Mexico and Peru, at the ſight of the horſes and the cavalry, ſufficiently intimated to the Spaniards that the horſe was unknown in theſe climates, which induced them to tranſport great numbers both for military ſervice, private convenience, and the propagation of the ſpecies. Some they turned looſe in different iſlands, and even on the continent, where they multiplied like other wild animals. Monſieur de la Salle, in the year 1685, ſaw ſome of theſe horſes near the bay of St. Louis, in North America; but ſo wild that he could not come near them. The author of the advantures of the Buccaneers ſays, "that in the iſland of St. Domingo, troops of above five hundred horſes are often ſeen; that at the ſight of a man they make a general halt, while one of them approaching within a certain diſtance, ſnorts, flies away, and all the reſt follow him." He adds, that whether theſe horſes have degenerated during their being wild, he cannot pretend to ſay; but he did not think them ſo handſome as thoſe of Spain, though undoubtedly of that breed. "Their head and legs, he deſcribes, as very large, the latter full of knots; their ears and neck long. The inhabitants eaſily tame them for their ſeveral employments, and the hunters load them with their hides. They are taken in toils, laid in places where they frequent, are eaſily entangled, and if by the neck, ſtrangle themſelves, unleſs ſome perſon happens to be ready to aſſiſt them. They are faſtened round the body and legs to trees, and there left two days without either meat or drink. This renders them tame, and in time they become as tractable as if they had never been wild: and if they ſhould by accident recover their liberty, they never regain their former wildneſs, but know their maſters, and quietly ſuffer themſelves to be retaken."

This demonſtrates, that theſe animals, naturally mild, are very much inclined to become familiar with man, and attach themſelves to him. Accordingly, none of them are ever ſeen to leave our dwellings for the foreſts and deſarts; but, on the contrary, expreſs the greateſt deſire of returning to their ſtables; though all they meet with there is a groſs food, always the ſame, and generally meaſured out rather by parſimony than their craving appetites; but the kind treatment they meet with compenſates for their other loſſes. When ſpent with fatigue, the place of reſt is a place of delight; they ſmell it from afar; they find it out in the midſt of the moſt crouded cities, and ſeem in every thing to prefer ſervitude to freedom. The habits they have contracted become a kind of ſecond nature; horſes left in the woods having been known to keep a continual neighing, in order to be heard; and at the voice of a man, have ran to him with tranſport; and amidſt a rich variety of agreeable nouriſhment, while deprived of human ſociety, they have been known to loſe their fleſh, and to become ſtrangely emaciated in a very ſhort time.

Thus education gives the whole turn to their manners; and this education requires an aſſiduity, care, and attention, that man will not beſtow on any other creature; but the continual ſervices of the horſe make him ample amends.

The fineſt horſes known in Europe are the Arabian: they are larger and fuller than the Barbs, and not inferior to them in ſhape. But as few of them are imported into France, the riding maſters have not made any circumſtantial obſervations on their perfections and defects. The Barbs are more common, their cheſt is long and ſlender, riſes beautifully from the withers, have little manes, the head well ſhaped, ſmall and lean; the ears handſome and well placed; the ſhoulders flat and ſlender: the withers narrow and plump: the back ſtrait and ſhort; the flank and ſides round, and not bellying out; the haunches firm, and well ſhaped; the croup or breech generally ſomewhat long, and the tail pretty high placed: the thigh well ſhaped, and ſeldom flat; the legs handſome, well ſhaped, and without hair at the paſtern joint; the foot well made; but the paſtern often long. They are of all colours, but generally brown. The Barbs are ſomething negligent in their goings; but, properly encouraged, ſhew an amazing ſwiftneſs and vigour: they are very light, and fit for running; and ſeem, of all others, the fitteſt to breed from. It were, however, to be wiſhed that they were of a taller ſize, the very largeſt being only fourteen hands; and one of fourteen hands and an inch is very extraordinary. Experience has ſhewn that in France, England, &c. they get colts larger than themſelves. Among the Barbs, thoſe of the kingdom of Morocco are accounted the beſt, except the mountain Barbs. Thoſe of the reſt of Mauritania are inferior to them, as are alſo thoſe of Turkey, Perſia, and Armenia. All horſes from a hot climate have a ſmoother coat than others. The Turkiſh horſes are not ſo well proportioned as the Barbs; the neck ſlim, a long body, and the feet too ſlender; but are very laborious and long winded. Nor will this appear ſtrange, if it be conſidered, that in hot countries the bones of animals are harder than in the cold; and for this reaſon it is, that though their ſhank bones are ſmaller than the horſes of this country, yet their legs are ſtronger.

The Spaniſh horſes, which are placed next to the Barb in rank, have a long thick neck, with a large mane; the head full large, and ſometimes the fore top large; the ears long, but well placed; the eyes full of fire, and the air noble and ſpirited; the ſhoulders thick, and the cheſt broad; the back often ſomething low; the ribs round, but the belly often too large; the croup generally round and large, though in ſome longiſh; the legs beautiful and without hair; the ſinew well detached; the paſtern ſometimes longiſh like the Barbs: the foot a little lengthened like that of a mule; and the heel often too high. The fine bred Spaniſh horſes are plump, well-ſet, and place the legs well on the ground; they have alſo a great deal of motion in their paces; great agility, fire, and ſtateline ſs. Their coat is generally black, or a light cheſnut; though there are ſome of all the uſual colours. But it is very ſeldom that any are ſeen with white legs or muzzles; the Spaniards having ſuch a diſlike to theſe marks, that they never breed from horſes which have them. A ſtar in the forehead is all they require; but they value horſes of one intire dark colour as much as we deſpiſe them: both theſe prejudices, tho' oppoſite, are perhaps equally ill founded, there being very good horſes with all kinds of marks; and ſome excellent among thoſe which are all of one colour. This minute difference in the coat does not proceed from the nature or conſtitution of the horſe; but from an external, and at the ſame time ſo ſuperficial a quality, that a ſlight wound in the ſkin is ſufficient to produce a white

ſpot:

ſpot: further, the Spaniſh horſes, whether intirely of one colour, or not, are all marked on the off thigh with the mark of the ſtud where they were bred. They are not uſually large ſized; though ſome riſe to fourteen hands and one or two inches. Thoſe of Upper Andaluſia are eſteemed the beſt of all, though they are apt to have the head too long; but this blemiſh is overlooked in conſideration of their excellent qualities; as courage, graceſulneſs, obedience, ambition; and in activity, they even exceed the Barbs. Theſe advantages recommend them above all other horſes in the world, whether for war, ſtate, or the manage.

The fineſt Engliſh horſes greatly reſemble the Arabians and Barbs in ſhape; indeed they owe their origin to them; but the head is much larger, though well made, and has a fine ſore-top; the ears longer, but properly placed. By the ears alone an Engliſh horſe may be diſtinguiſhed from the Barb: but the greater difference is in the ſize; the Engliſh horſes are much larger and well-ſet. Their common height is fourteen hands two inches, and even fifteen hands is not very extraordinary. They are all colours, and all marks; are generally ſtrong, mettleſome, bold, bearing great fatigue, excellent for hunting and racing, but want air and agility; they are ſtiff, and have little freedom in their ſhoulders.

The Italian horſes were formerly much finer than at preſent, the ſtuds having been neglected there for ſome time paſt: the kingdom of Naples, however, ſtill affords fine horſes, eſpecially for carriages; but they have, in general, large heads and thick necks: they are alſo untractable, conſequently are difficult to be trained. Theſe defects are, however, in ſome meaſure compenſated by the largeneſs of their ſize, their ſpirit, and the beauty of their motions. They are excellent for parade, and very much affect ſtatelineſs.

The Daniſh horſes are of ſuch a large ſize, and ſo well ſet, that they are preferred to all others for coach horſes: ſome are perfectly well moulded, though in general their formation is not very regular; moſt of them having a thick neck, broad ſhoulders, the back a little too long and low; and the croup too contracted for the breadth of the cheſt; but they all move well, and are in general excellent for war and ſtate. They are of all colours, even the moſt uncommon; the pye and ſpotted being ſeldom ſeen but in Daniſh horſes.

Germany affords ſome fine horſes, but the generality are heavy and thick winded; though moſt of them come from Turkiſh and Barbary horſes, of which there are many ſtuds; as alſo of Spaniſh and Indian horſes: thus they make no figure in hunting and racing; whereas the horſes of Hungary, Tranſylvania, &c. are very light and fleet: the Huſſars and Hungarians ſlit their noſtrils, with a view, it is ſaid, to mend their wind, and, at the ſame time, to prevent their neighing in the field; it being affirmed that horſes, whoſe noſtrils have been ſlit, cannot neigh. It has not indeed been in my power to examine this particular; but it ſeems natural to think, that the operation can only weaken their neighing. The Hungarian, Croatian, and Poliſh horſes are noted for having what is called the mark in all their fore teeth, which continues to old age.

The Dutch horſes are very good for coaches, and are moſt commonly uſed in France. The beſt come from Friezland. The countries of Bergue and Juliers alſo breed very good ones. The Flemiſh horſes are far inferior to thoſe of Holland; they have generally large heads, broad feet, and their legs ſubject to dropſical ſwellings. The two latter are capital faults in coach horſes.

France produces horſes of all kinds, but not many which may be called fine. The beſt ſaddle horſes come from the Limoſin, being ſomething like the Barb, and excellent hunters, but of a ſlow growth. They muſt not be broke young, nor put to any ſervice till they are eight years old. Auvergne, Poitou, and the territory of Morvant, in Burgundy, alſo produce very good ponies. But Normandy, next to Limoſin, affords the fineſt horſes; and if not ſuch excellent hunters, they are preferable to the reſt for war, are better ſet, and ſooner trained. Lower Normandy and Cotentin, are famous for very fine coach horſes; they are lighter, and more ſprightly than the Dutch horſes: Franche compté, and the Boulonnois furniſh very good draught horſes; but a general fault in the French horſes, is the width of their ſhoulders; whereas thoſe of the Barbs are too much contracted. *Buffon.*

Though the moſt experienced horſemen are not always agreed in ſome points relating to the ſhape, make, and goings of a horſe, yet they almoſt always accord in this, that there ought to be a juſt proportion in all his parts. That even when he is taken to pieces, and examined ſingly in his particular members, though ſome defects may appear, yet when they all bear a juſt correſpondence one to another, and concur in ſuch a manner as to render his action eaſy, juſt, and regular; ſuch a horſe cannot be greatly diſagreeable, but will, for the moſt part, move well, and with a tolerable good grace. On the other hand, ſuppoſe a horſe has ſome parts exquiſitely fine, and others indifferent, which frequently happens, it will mar his beauty, and cauſe him to look diſagreeable, and for the moſt part affect his gait and action.

In order to have a horſe beautiful and finely made, it has been agreed, on all hands, that his head ſhould not be long nor too large, rather lean than fleſhy; his ears thin and narrow, and of a becoming length, well ſet on, pointing inwards; his brow or forehead not too broad and flat; his noſe ſomewhat riſing, and of a good turn; his noſtrils wide and thin; his muzzle ſmall; his mouth neither deep nor too ſhallow, with a ſtar or ſnip down his forehead, or blaze, which is no way unbecoming, unleſs it be too large and diſproportioned.

Horſes that are thus marked have generally one or more of their feet white, which is alſo very beautiful, and looks lively. His jaws ſhould be thin and ſufficiently wide, not approaching too near together, nor too high upwards towards the onſet, that he may have ſufficient room to carry his head eaſy, and in good place. His eyes well formed, ſprightly, and of a middle ſize. His neck ſhould be arched towards the middle, ariſing by a beautiful gradation out of his breaſt and ſhoulders, the muſcles thereof diſtinct, but no where overcharged with fleſh, growing ſmaller and thinner, as it approaches towards his head. His ſhoulders ſhould be thin from the withers, with a gradual enlargement downwards, that his boſom or breaſt be not too narrow nor too groſs. His fore-legs ſtraight and well placed; his joints lean and bony; his knees not bending, and his paſterns not too long; his feet round and ſmooth, and his ſinews firm and well braced; his carcaſe rather round than flat; his back not too low, and for ſtrength and durableneſs pretty even and ſtraight. His ribs rather home than open, as they approach towards his haunches; his buttocks round, and the muſcles not too fleſhy but diſtinct; his hocks or gambrels neither ſtanding

ing too wide, nor too near together; his hocks ſhould be lean and no ways puffed or fleſhy; his paſterns ſhort, his legs flat and thin, and his tail ſet in a good place, rather high than low, riſing upon every motion of his body. The more theſe properties concur in any horſe, the more beautiful he muſt be, eſpecially when they correſpond and agree in due proportion, one to another; and the more a horſe is wanting in theſe, the more plain and ordinary he will appear.

HORSE-HOE, *ſee the article* CULTIVATOR *and* HOE.

HORSE-HOEING, the operation of cultivating plants according to the principles of the New Huſbandry; viz. by hoeing the intervals or alleys between the rows of corn, and by that means ſupplying the plants with freſh nouriſhment.

"I have tried, ſays M. de Valliers, to hoe my alleys after M. de Chateauvieux's method, which I look upon as the beſt and moſt expeditious; notwithſtanding that ſeveral difficulties which I have met with in the practice of it, have obliged me to give it up. For example, the great furrow in the middle of the alleys is, according to his directions, to be filled up by two turns of the plough, one on the right-hand, and the other on the left, after which it is to be opened again by one turn of the cultivator with two mould-boards, or two or three turns of the common plough.

"When I ſet about this work, the firſt turn of the plough, if the ſhare went to any depth worth ſpeaking of, always filled up the furrow in ſuch manner, that to prevent its being poached by the horſes, I tried to make them walk on one ſide, upon the upper-ground, and conſequently very near to the rows of corn: but then, in the firſt place, I could not avoid the deſtruction of a great number of plants, without giving ſuch attention as was not only exceſſively troubleſome, but almoſt impracticable: and ſecondly, I could plough only on the ſurface; becauſe, as the furrow was filled, the plough could turn up but very little earth, without being choaked, and becoming extremely heavy.

"If, to ſave the plants, I made the horſes tread partly upon the mould turned over into the furrow, the plough choaked equally, and for the ſame reaſon, whenever the furrow was cut deep. All I could do in this caſe, was to give only a ſuperficial ploughing: and with that it was impoſſible to uſe the cultivator with two mould-boards, to form the furrow, becauſe that inſtrument cannot work in any but a looſe well-tilled ground.

All theſe inconveniencies may not happen in a ſoil different from mine. I am the more inclined to think this, as M. de Chateauvieux certainly does not experience them: but at the ſame time I muſt likewiſe obſerve, that this juſtly celebrated gentleman has inſtruments ſo perfect, and directs his ſervants with ſuch ſuperior judgment, that few can expect eaſily to equal him in the practice of the New Huſbandry.

"Not being able, for the above reaſons, to do with one turn of the cultivator with two mould-boards, what, as M. de Chateauvieux himſelf obſerves, can frequently not be done with leſs than three or four turns of the common plough, which, added to the two turns that are given to fill up the furrow, make in all five or ſix bouts, I purſued, and with great advantage, nearly the method before deſcribed. I ſay nearly that method, becauſe I have made ſome few alterations, by which I think it is rendered both eaſier and better.

"1. I make the mould-board twelve or thirteen inches deep, inſtead of nine or ten that it was before. The furrows are by this means made wider, and the plough is more eaſily drawn, becauſe it finds more room to diſcharge its load of earth in, and ſuffers leſs preſſure.

"2. To give the ſecond hoeing with the plough, inſtead of continuing to turn the earth over towards that ſide of the alley where only one furrow was turned up at the ending of the firſt ploughing, I, on the contrary begin this ſecond at that furrow, approaching, if poſſible, to within two or three inches of the row of corn, and then I make a furrow in the contrary direction, which turns the earth up againſt that row.

"My reaſon for ploughing ſo near the rows, when I gave this ſecond hoeing is, that I have obſerved that the rains which fall pretty frequently in the ſpring, between the firſt ploughing and the ſecond, harden the earth greatly, and that drought afterwards hardens it ſtill more, ſo that the roots of plants can no longer pierce or ſpread in it with eaſe; and yet nothing is more neceſſary, in order to their being benefited by every culture of the earth, than that they ſhould find an eaſy paſſage into the mould which lies next to the rows. It is therefore highly proper to ſtir that mould, when the ſecond hoeing with the plough is given, which, with me, is when the corn has begun to ſpindle; that being the time when the plants ſhoot with the greateſt vigour, and when their roots ought conſequently to begin to extend to ſome diſtance.

"I have not perceived that the plants have been at all damaged by the plough's coming ſo near them. They ought to be ſo much the leſs hurt thereby, as the rows are placed over a furrow which has been cut deep; a ſituation which, alone, is capable of making the corn tiller, and puſh ſtrongly: though the aſſiſtance of culture is likewiſe neceſſary, to ſupply the ſtalks and ears with plentiful nouriſhment.

"I am the better pleaſed with this method of bringing the hoe-plough almoſt cloſe to the rows, as it facilitates a very important operation ſtrongly recommended by M. Duhamel, and which I never before thought practicable: I mean, the raiſing up of the earth about the bottom of the plants; as well to give them greater nouriſhment, as to prevent their being lodged. The following is my method on this occaſion.

"When I fill up the furrow which I have cut as cloſe as poſſible to the row, I hold the plough ſloping, in ſuch manner that the earth is forced away from it, and is raiſed up about the plants. If this ſlope is not ſufficient, which may ſometimes depend on the condition of the ground, or the dexterity of the ploughman, I, in that caſe, make the mould-board two or three inches wider, when I uſed to fill the furrow, than it was when I made that furrow: and to this end I ſcrew on to the extremity of the mould-board, a thin plate of iron about four or five inches wide. Thoſe who practiſe the New Huſbandry in ſo extenſive a manner as to employ ſeveral ploughs, will find no inconvenience in having one, larger than the reſt, purpoſely for this important operation. As I do not give this ſecond hoeing with the plough, till after the corn has begun to ſpindle, it is eaſy for me to avoid burying the plants, eſpecially if there are no great clods in the ground: but, at all events,

I always earth the plants up as much as poſſible, when there is no other danger than that of burying here and there a few of them, becauſe that accident is eaſily remedied afterwards, if it be worth while.

"When I am to give the third hoeing with the plough, I conſider the condition of the ground. If it is in good tilth, well looſened, and free from weeds, I uſe only the cultivator: otherwiſe I uſe the plough, three or four turns of which are ſufficient to perform this operation in the following manner:

"The firſt cut turns the earth over into the middle furrow: the ſecond and third are on a contrary direction; and the fourth takes up what was looſened by the third, whereby the furrow is replaced in the middle of the alley. Some time after this, and eſpecially if a ſhower of rain has fallen, I cut that furrow ſtill deeper, by one turn of the ſingle or double cultivator, as M. de Chateauvieux directs.

"But as, even after all theſe ploughings, the great furrow may chance to be neither deep enough, nor ſufficiently cleared of mould, owing either to the imperfection of the inſtrument made uſe of, or to the inaptitude of the ploughman, that defect may eaſily be remedied after harveſt, by giving one ploughing more, which is to be begun by throwing up the earth to the right and left towards the ſummit of the beds; that is to ſay, over the ſtubble. This practice is alſo confirmed by M. de Chateauviex's inſtructions.

"The one ploughing extraordinary which this operation requires, ought not to be thought much of; becauſe the moſt important point in the New Huſbandry certainly is, the providing of a good depth of well ſtirred would, for the plants to extend their roots in."

The difficulty complained of by this gentleman, and ſome others abroad, in hoeing their crops, cultivated according to the New Huſbandry, was occaſioned, by their putting one or two wheels to their hoe-ploughs and cultivators. The hoe-plough ſhould have no wheels; neither ſhould any cultivators be ſubſtituted in the room of the hoe-plough. *See the article* CULTIVATOR.

HOT-BEDS, beds of earth enriched with manure, in order to forward vegetation, when the ſeaſon or climate is not warm enough for the purpoſe.

By means of hot-beds, ſkilfully managed, the ſeeds of plants, brought from any country between the tropics, may be made to flouriſh even under the poles.

Heat and humidity being the great inſtruments of vegetation, to promote the growth of any plants, theſe muſt be duly proportioned, ſo as neither to exceed nor come ſhort of the bounds nature has allotted for it.

The uſual way of making hot-beds, is of horſe litter and graſs mixed together, and left on a heap for eight or ten days to putrify, and then removed into a bed, and covered up with glaſſes.

For raiſing cauliflowers, cucumbers, melons, radiſhes, and other tender plants and flowers in January or February, Mortimer directs to provide a warm place, defended from all the winds, by being incloſed with a pale or hedge of reeds or ſtraw, about ſix or ſeven feet high. Within this raiſe a bed two or three feet high, and three feet over, of freſh horſe dung, about ſeven or eight days old; then tread it down very hard, make it level, and, if you will, edge it round with boards or brick, laying fine rich mould about three or four inches thick on it. When you find by your finger, that the extreme heat of the bed is over, plant your ſeeds at pleaſure, and ſet your forks four or five inches above the bed, to ſupport the frame, and cover with ſtraw or mat, to ſecure the ſeeds and plants from cold and wet; only uncover them in a warm day, an hour before noon, and cover them again an hour after. Obſerve to earth up your plants, as they ſhoot up, and, when able to bear the cold, tranſplant them.

In Holland they uſe hot-beds made of ſand; and likewiſe of tanners bark, which, when once rightly prepared, will maintain an equable heat for ſix months.

Bradley propoſes very juſtly a thermometer to be uſed to regulate the heat of the hot-beds. Thus, a hot-bed for cucumbers muſt be kept ſo hot as to raiſe the ſpirit in a glaſs to the ſame height as the natural temperature of the weather will raiſe it about the end of May and June, when cucumbers will grow without artificial heat or ſhelter.

HOVEL, a ſhed open on the ſides, and covered overhead.

HOVEN, a diſeaſe common to cattle, on eating too greedily of green clover. It conſiſts in the paunch of the creature being ſwelled to a very great degree, which often, if not prevented, puts an end to the creature's life. The ſureſt method of curing this terrible diſeaſe, is that of making an inciſion into the paunch of the beaſt, and by that means the wind, which cauſed the ſwelling, will eſcape through the orifice, and the creature recover.

A correſpondent of the editors of the Muſeum Ruſticum has given the following account of his performing this operation.

"I took, ſays he, a ſharp-pointed pen-knife, and fixing my eye on the moſt prominent part of his belly, thruſt the blade through the integuments quite into the abdomen: there iſſued out a great guſt of wind very fetid, with ſome water of a rediſh colour; the bullock ſeemed eaſier, but far from well; for the wound preſently cloſed up, and admitted no more air to eſcape; ſo that I was under the neceſſity of ſtabbing him twice more in different parts of the belly before he was thoroughly relieved, which, by the help of a clyſter after the laſt ſtab, was preſently brought about: and here give me leave, gentlemen, before I leave this ſubject, to give a few cautions to thoſe who may be under the neceſſity, one time or other, of performing this very uſeful operation: reflection and experience warrant me in them, therefore I ſhall freely proceed.

"Firſt then, if it be performed with a pen-knife, not to be fearful in puniſhing in the blade a proper length, till you find wind iſſue out; for if the wind be in the cavity of the belly, you cannot poſſibly hurt the gut, the whole body of the wind being between you and it, which no reaſonable bladed pen-knife can touch; and if the wind ſhould be pent up in the inteſtine, you muſt penetrate it before the beaſt can be relieved. To this laſt, perhaps, it may be objected, that we run the hazard of killing the beaſt by wounding the gut; but I am far from thinking ſo, as I have ſeen many wounds of the inteſtine, both in man and beaſt, very happily cured: yet granting there might be ſome danger in it, ſtill we are certain, if the poor beaſt can get no relief, it muſt die; and ſo circumſtanced, ſurely, gentlemen, a doubtful remedy is better than none at all.

"Another

" Another caution is, that where theſe wounds are made in the belly with a proper pen-knife, it is not adviſable to have them ſown up; for where there is a continual motion or action, as there is in the muſcles of the belly and parts adjacent, ſuch a practice is not only unwarrantable, but cruel; and why ſhould we not behave with humanity to the brute ſpecies, as well as any other?

" My laſt caution and advice is, that upon all theſe occaſions, when the beaſt is relieved of his wind, a proper clyſter ſhould be thrown up immediately, as hot as he can bear it: theſe clyſters ſtrangely relieve them, by acting as a warm, comforting bath to their diſtempered bowels, and emptying the ſame of the load of muck within them."

This account was ſent by Mr. John Wynn Baker, near Dublin, to be publiſhed in the *Muſeum Ruſticum*, in the year 1764. Since that time Mr. Baker has made improvements upon the method of ſtabbing cattle, hoved, or ſwelled, by eating clover, or other graſs, while it is very ſucculent; and moiſt with rain or dew, and which he has fully ſet forth in his report to the Dublin Society, for the year 1769, from whence the following is extracted.

" Farmers, in general, are pretty well informed of the danger, to which horned cattle are liable, from their eating clover, by its hoving them. This unfortunate circumſtance may deter many from the uſing clover, in the manner already mentioned. I am therefore to ſhew the means of avoiding the danger.

" And therefore, when they begin to uſe clover, it ſhould be mowed two or three hours before giving it to the cattle. Begin the buſineſs in dry weather, and give it them ſparingly in the commencement—a few days will render any further precautions unneceſſary: becauſe it may be mown and brought home immediately to fodder with, even when wet; until the ſecond growth begins to be fit for cutting, and then a little caution will be again required, and that more particularly, if the weather be moiſt; and alſo when the clover is too ſhort for mowing, it will be proper to be cautious in turning the cattle in to graze for a ſhort time, in the beginning, and when no rain or dew is upon the clover; for it is the youth or ſoftneſs of the clover, and rain or dew upon it, which are productive of the diſeaſe; when cattle, in their firſt feeding upon it, are allowed to eat too freely of it.—And it is very remarkable, that I tried ſome of my cattle with mown graſs, and mown clover, and they rejected the graſs for the clover; becauſe I preſume it is ſweeter and more juicy; that juicineſs is the very thing, as I conceive, which generates the air, to the great annoyance and infinite danger of the breaſt. Theſe matters being attended to, the neceſſity of any further care ceaſes; unleſs upon a change of paſture, and then to clover again: in that caſe, I conceive the like precautions ſhould be obſerved.

" I ſpeak of theſe precautions from experience; for it may be remembred, that in the year 1764, I loſt a bullock by his eating clover. And laſt ſummer, I had one bullock much diſeaſed from the ſame cauſe; and alſo another bullock and cow, from their eating young lucerne; all from the careleſſneſs and diſobedience of ſervants; who imagine they know things and conſequences better than any other perſon whatever. However, I happened to be at home upon both theſe occaſions, and had the remedy in my own hand. I ſtabbed them all three, according to the method related in my report of the year 1764. A method ſo eaſy, now ſo familiar to me, and attended with ſo much ſafety, and ſpeedy relief, that if I had five hundred head of cattle diſeaſed in that way, I ſhould not fear the loſing one by the operation.

" One of the plough bullocks, which I ſaved by ſtabbing laſt ſummer, was the very fellow that was in the cow's belly, which I ſaved in the year 1764, when ſhe was diſeaſed in the ſame manner, as related in my report for that year. And what ſeems to prove the inoffenſiveneſs of this method of cure, namely ſtabbing; this bullock was ſtabbed about ſeven o'clock at night, and was ploughing all the next day, with as much unconcern, as if he had not been diſeaſed or ſtabbed at all. And ſince finiſhing this report, I have ſtabbed this bullock twice in a fortnight, this ſummer, 1770, and we cannot tell the cauſe of his ſwelling. He is now very well, and was worked in the plough the day after being ſtabbed.

" With this knife (Plate XIX. Fig. 7.) I ſtabbed the ſecond bullock, which I had hoved laſt ſummer. Half an hour had not elapſed, before the boy who uſed to drive him in the plough, came running to me with the ploughman's phraſe, who was helping to drive the bullock about, crying out, " Sir! Sir! the bullock is burſting!" I ran to him, not being at the time above twelve or twenty perches off, with the knife in my pocket. The man told me the bullock had fallen down, not being any longer able to move. Obſerving no wind to paſs the wound; without heſitation I paſſed the knife into the ſame external orifice, and ſo into the paunch, or great receptacle of the inteſtines, when the quantity and impetuoſity of the air was aſtoniſhing.

" The diſtreſs of the beaſt, at this ſecond time of my ſeeing him, was truly pitiable. His tongue hung out of his mouth; his eyes full, as if they would have ſtarted out of his head; his rectum diſtended externally, at leaſt five inches, and his hollow groans ſuch as would move inhumanity itſelf.

" This ſecond operation being neceſſary, requires ſome further explanation. We have ſeen, that although the bullock was ſtabbed, yet that he grew worſe, inſomuch that a ſecond operation was neceſſary. Looking at this conſequeuce ſuperficially, may induce one to imagine, that ſtabbing will not afford the expected relief. But it will as certainly do it, as wounding a blood veſſel will be productive of the emiſſion of blood. But as I conceive here is the cauſe. When the bullock came to move about, that motion had altered the poſition of the internal oriſice, ſo that the air could not paſs with the ſame rapidity, with which it rarefied internally, and when the bullock fell, (or laid down, I am rather willing to believe) the internal orifice was ſtill more removed from its oppoſite poſition to the external one, and conſequently no air could paſs the wound: and therefore the diſeaſe muſt inevitably increaſe every minute with great rapidity, and thereby alſo contribute to moving the internal orifice farther from the external one. But the moment another puncture was made in the paunch, oppoſite the external one, we ſee the air ruſhed out, the beaſt got well, and was, I think, ploughing all the next day. Whereas, had not the ſecond wound been given, I am perſuaded he would have died in ten or fifteen minutes.

" In performing this operation, there is one circumſtance which I muſt not omit to recommend to the attention of thoſe who may have occaſion to practiſe it: that they are careful not to enter the knife too near the hip-bone; which may be eaſily done by the deception which the flatulency excites, for the beaſt, when diſeaſed, is ſo diſtended, that the operator may be deceived in the poſition of the hip-bone, not being ſo apparent as one would imagine. I therefore recommend the feeling for the ſhort ribs, before the puncture is made; and they being found, paſs the knife as near the center as may be, between them and the hip-bone.

I mention this circumſtance thus particularly; becauſe, in ſtabbing the cow already mentioned, I made the wound too near the hip-bone, which I ſuppoſe wounded the veſſels, and verge of the muſcles adjoining to it; by which means the cow bled, I ſuppoſe not leſs than three or four ounces. Were that all it would be of no moment; but to the improper poſition of the wound, I attribute in ſome meaſure, the feſtering which enſued: whereas the bullocks did not bleed half a teaſpoonful; their wounds never feſtered; neither did they require any thing to be done to them, ſave that of rubbing on a little tar to keep off the flies.

" I was induced to invite the public, to ſee the remedy which I uſe, from hearing, that a great number of cattle are loſt every year by the diſeaſe before us; as I hope thereby to diffuſe the knowledge of ſo ſimple an operation through the kingdom. I am informed of a man in the county of Dublin, who loſt ſeventeen fine cows in an hour laſt ſummer, by this diſeaſe; one with another worth ſeven pounds a cow. A poor woman in my neighbourhood had but two in the world; I am told ſhe loſt them both in half an hour, by their ſlipping into a gentleman's clover; and I hear of ſeveral cattle loſt this ſummer.

" The bullock ſtabbed as abovementioned (he being a ſtrong beaſt) gave me a kick, which knocked me down, and rendered me incapable of ſtanding for ſometime. That other people may not meet with the like accident, I recommend to them, that they ſtand with their left ſide cloſe to the left ſhoulder of the beaſt to be relieved, laying the left hand upon the back of the animal, and with the right hand perform the operation, in the part, and with the knife diſpoſed as deſcribed above. A penknife is too ſmall.

" From A (Plate XIX. Fig. 7) to the point, the knife is as ſharp as a lancet. From A to B, the ſhank gradually ſwells, and does not cut at all, but has a round edge on each ſide, that it may not cut, in with-drawing the inſtrument.

C C, into, or upon the ſhoulder of the handle, ſcrews an hollow ſocket or caſe; that, and the handle both of lignum vitæ. The handle five inches long.

The blade is alſo five inches long, and when uſed, is ſent quite home to the hilt.

HOVER GROUND, light ground.

HOUSE-BOTE, an allowance of timber out of the lord's woods, for the repairs of a houſe.

HULLS, the chaff, or huſks of corn.

HURDLES, are certain frames made either of ſplit timber, or of hazel-rods, wattled together, to ſerve for gates in incloſures, or to make ſheep-folds, &c.

HURDS, or *Hords* of flax or hemp, the coarſer parts ſeparated in the dreſſings from the tear or fine ſtuff.

HURLE-BONE, in a horſe, a bone near the middle of the buttock, very apt to go out of its ſocket with a hurt or ſtrain.

HUSBANDRY, the buſineſs or employment of a farmer, or perſon who cultivates land, &c.

Huſbandry is divided into two kinds, and diſtinguiſhed by the epithets old and new. The former is that which has been practiſed in all countries from the moſt early times; and the latter that introduced by the ingenious Mr. Tull, and often called the horſe-hoeing huſbandry.

Experience ſhews, that land, though ever ſo well tilled in the autumn, when wheat, for example, is ſown, hardens and ſoddens in the winter; its particles, beaten down by heavy rains, and ſunk by their own weight, approach each other daily more and more; the roots of the plants cultivated have conſequently leſs and leſs room to extend themſelves in queſt of their neceſſary food; and their interſtices in the earth become of courſe ſo few and cloſe, that they are not able to pierce through them, whilſt weeds ſpring up, and rob them of their nouriſhment. By this means the earth, reduced to nearly the ſame condition as if it had not been ploughed at all, is unable to aſſiſt the plants ſown in it in the ſpring, when they ought to ſhoot with the greateſt vigour. They conſequently then ſtand moſt of all in need of the plough to deſtroy the weeds, to lay freſh earth to their roots in the room of that earth which they have exhauſted, to break the particles of the ground anew, ſo as to enable their roots to ſpread, in order to their gathering an ample proviſion of food, which then does them the greateſt ſervice.

In the common huſbandry, the whole attention is to provide a great ſtore of nouriſhment for the wheat, at a time when it ſcarcely conſumes any, as it then produces only a few blades, after which it is left to itſelf, at a ſeaſon when it might, and ſhould be moſt aſſiſted by proper culture; a management as prepoſterous as it would be to give a child a great deal of food, and diminiſh it gradually as he grows bigger; or, to uſe Mr. Tull's compariſon, to give ſilk-worms, before they are hatched, treble the full ſtock of leaves neceſſary to maintain them, till they have finiſhed their ſpinning, and not to allow them any when they really want being fed.

The great advantage of having land in fine tilth before it is ſowed, is univerſally acknowledged: but we muſt not ſtop at thoſe firſt preparations. Plants require a continuation of culture while they grow, and muſt not be forſaken till they have attained their full maturity.

Thoſe who are againſt the frequent ploughings uſed in the New Huſbandry, are afraid of drying the earth too much; becauſe, ſay they, the moiſture eſcapes more eaſily from a well looſened ſoil, than from a hard and cloſe earth.

In anſwer to this it will appear from many of the following experiments, that, even in the drieſt weather, land cultivated according to the new method, continues conſtantly moiſter than that which is managed in the old way. Inſtead of a ſtagnant wet, more hurtful, perhaps, than beneficial, to plants; each made fine to a good depth, is prepared, as the reverend Dr. Elliot expreſſes it, " with open mouth, to drink and retain the dew, which, when it falls upon the land that is untilled, or but poorly tilled, does not ſink far, but is carried off by the next ſun's heat." That dew is one of the greateſt fertilizers of the earth, has been repeatedly proved; and

that it will penetrate ſo deep in a fine looſe ſoil, as to keep that moiſt, while the ground badly tilled is parched up, appears, among many demonſtrations, from Mr. Evelyn's experiment of digging a hole, and filling it up with its former mould well pulverized: or, as Mr. Tull obſerves, till a field in lands; make one land very fine by frequent deep ploughings, and let another be rough, by inſufficient tillage, alternately: then plough the whole field croſs-wiſe in the drieſt weather, which has continued long; and you will perceive, by the colour of the earth, that every fine land will be turned up moiſt; but every rough land will be as dry as powder, from top to bottom.

Another proof of the benefits which ariſe from ſtirring the ground well and often between plants, while they grow, and conſequently a confirmation of the fundamental principle of the horſe-hoing huſbandry, is thus drawn by Dr. Elliot, from the common manner of raiſing Indian corn.

"The land, ſays he, being previouſly prepared, planted, and the corn come up, we plough a furrow off from the corn on each ſide, then hoe it, and the next time plough up to the corn; ſo that this tillage is nearly the ſame as is now propoſed for wheat, or whatever we would plant: only by the way, I would obſerve, that the ploughings between the rows, for Indian corn, is ſo ſhallow, that one would be apt to think it intended for nothing more than merely to kill the graſs and weeds; whereas it is found by experience, that, though there be neither graſs nor weeds, the ploughing and hoeing will make the corn grow, and that the more the land is ploughed and hoed, the better and longer it will reſiſt drought, and yield the better crop: nay, what is ſtill more remarkable, if the Indian corn be well tilled, the next crop, whether it be oats or flax, will be proportionably greater and better; ſo that the land muſt have gained ſtrength and richneſs. If it were not ſo, why did not the Indian crop exhauſt and ſpend the ſtrength of the land, eſpecially when we conſider how large that corn is made to grow by good tillage? But we find the contrary; the better the crop of Indian corn, the better the crop will be of oats. There is no ſort of huſbandry, wherein the ſuperior force and virtue of tillage doth ſo evidently appear, as in the raiſing of Indian corn: for if you ſhould plough and harrow the beſt of land, and ſow or plant the corn, and never do any thing more to it, there will be leſs corn than if you ſhould plant poor land, and tend it well: the poor land well ploughed and hoed, ſhall bring a greater crop than the rich land. We hereby ſee the efficacy and advantage of this repeated tillage, which falls in ſucceſſively, according to the exigency and want of the plant in its ſeveral degrees of growth, and keeps the land in a proper ſtate. Why ſhould it not have the ſame effect upon wheat, and every other plant that is ſuſceptible of the like culture?"

If ſeveral rows of wheat are ſown in a poor but well ploughed land, the blades of the corn will turn yellow in the ſpring, eſpecially in dry weather. Let the earth bordering upon theſe rows be ploughed deep, in ſome places near, and in others farther from the rows, and the plants will reſume their proper colour; firſt in the places neareſt to the new ploughed ground, and afterwards gradually in the others, according to their diſtance; which proves that they recover their verdure, in proportion as their roots reach the looſe mould. This holds equally true in all plants; for Mr. Tull declares, that he does not remember ever to have ſeen a poor one contiguous to a well-hoed interval, unleſs overpowered by a too great multitude of other plants, an exception which muſt be equally made if it were a plant that required more or leſs heat or moiſture than the ſoil or climate afforded; and that, on the contrary, he has ſeen plants grow to an amazing ſize, when the earth around them has been frequently tilled. He mentions, among others, a plant of ray-graſs, which chanced to ſtand in a turnip field, where, being hoed as the turnips were, it acquired a bulk at leaſt equal to a thouſand plants of the ſame ſpecies; and a plant of muſtard, which grew higher than he could reach, ſo as to be more like a tree than an herb.

The ſtirring of the earth about the plants whilſt they grow, is productive of ſuch excellent effects, that, in ſome parts of Berkſhire, and in many places in France, they hand-hoe their corn, particularly wheat, and find that the crops amply repay all the charge and trouble of this expenſive operation; which, however, cannot be performed but in well-peopled contries. Every huſbandman will immediately ſee, how much a hoe-plough is preferable for this work, and that, to uſe it rightly, the corn muſt neceſſarily be planted in regular rows, as it is in the New Huſbandry.

Our reaſon tells us, that the longeſt lived plants ſtand moſt in need of this culture. Perennials require it more than annuals, and wheat which is ſown in autumn, and does not ripen till nine months after, want it more than ſpring-corn, which occupies the ground only for a few months. The former has to conquer a ſoil rendered hard during the courſe of the winter; but the other has not that difficulty to ſurmount, though both of them, and indeed all ſorts of plants, are greatly invigorated by the repeated laying of fine freſh earth to their roots. Every one knows the vaſt efficacy of wood-land, before its native ſtrength and vigour are exhauſted; and ſuch, in ſome degree, is that which this tillage furniſhes; beſides being conſtantly attended with the advantage of deſtroying weeds. How far this laſt important part of agriculture was well executed by the ſarcling, or ſarrition, as Mr. Tull calls it, of the ancients, we ſhall not pretend to ſay, becauſe we have no clear account of the manner in which it was performed; but it does not ſeem to have been in any way equal to the horſe-hoeing huſbandry, which likewiſe, among its many other excellencies, keeps the land from going out of tilth.

We ſhall here add Mr. Duhamel's obſervations on the uſe of dung, as given by that gentleman in his Elements of Agriculture.

"It is often, ſays he, more advantageous to increaſe the fertility of land by ploughing, than by dung: 1. Becauſe, in general, only a certain quantity of dung can be had, the product of twenty acres being ſcarcely ſufficient to produce enough for four or five; whereas the particles of the earth may be divided and ſubdivided almoſt to infinity. The help derived from dung is therefore limited; whilſt no bounds can be ſet to the benefits that may accrue from ploughing.

"2. Few plants raiſed in dung ever have the fine flavour of thoſe which grow in a good ſoil moderately dunged. Our kitchen gardens and our other grounds afford daily inſtances of this truth. Pulſe, pot-herbs, and fruit, are ſeldom ſo good in the neighbourhood of great cities, where dung abounds, as in country gardens, where but little of it is uſed. The corn raiſed in thoſe

exceſſively dunged lands, yields a great deal of bran, and not much fine flour, and is difficult to keep. Nice horſes will not eat oats of the growth of fields manured with human ordure. But nothing is ſo ſtriking as the difference between the wine of an undunged vineyard, and that of vines which have been greatly dunged.

"3. Dung, which is ſuppoſed to act by fermentation, cauſes indeed an inward diviſion of the particles of the earth, which muſt be very uſeful, as well as the food which it furniſhes to plants: but the plough, beſides dividing thoſe particles, changes their ſituation, and turns the ground upſide down, ſo that the part which was expoſed to the influences of the air and dews, takes the place of another part which is brought from within the earth, up to its ſurface. The conſequence of this is, that well ploughed land is not exhauſted by weeds, and that it admits the moiſture of rains and dews, together with the rays of the ſun, all of which contribute greatly to render it fertile, as has been proved by very many experiments.

"4. Dung attracts inſects, and thoſe inſects gnaw plants. It is well known that the roots of trees planted in dunged ground, are very liable to be damaged by inſects: and this is one of the chief reaſons why floriſts baniſh dung from their gardens. Worms, grubs, and other ſuch like vermin, make dreadful havock in their beds of flowers; and I have ſeen meadows where the graſs has been entirely deſtroyed, by their eating its roots.

"I muſt add, that moſt ſorts of dung contain a great many ſeeds which fill the land with weeds.

"5. It is true that dung is equally ſerviceable to light lands, and to ſtrong; but the ſame may be ſaid of ploughing.

"Land is too ſtrong when its particles lie ſo cloſe together, that the roots of plants cannot extend between them, without great difficulty in queſt of their neceſſary food; for want of which they will remain poor and ſickly: but when the ground has been well looſened by repeated ploughings, and its plants are ſet at greater diſtances from each other, thoſe roots will be able to ſpread freely on all ſides, to pervade every minute chaſm, and to collect ſuch quantities of food as will make the plants grow ſtrong and vigorous. The friendly influences of the atmoſphere will then penetrate to them. What plainly proves the good effects of looſening ſuch ſoils, is, that their fertility is ſometimes increaſed by a mixture of ſand, inſtead of dung. Now ſand does not afford any nutritive ſubſtance; but only hinders the particles of the earth from re-uniting too cloſely.

"Ploughing is equally beneficial to light lands, for the very contrary reaſon; though theſe do not require ſo much of it as the other. There is no danger of their being exhauſted by any expoſure to the ſun; but, on the contrary, they acquire an additional degree of fertility by the ſtirring and grinding of their particles, and are thereby the better fitted to receive the moiſture of rains and dews, and the ſalutary influences of the air and ſun; whilſt their inward pores are at the ſame time better adapted to the proper extenſions of the roots of plants, by their being leſſened.

"But let the benefits ariſing from dung be ever ſo great, let the means of obtaining enough of it be ever ſo eaſy, and let even its defects be corrected as much as can be, ſtill it will not be the leſs true, that frequent ploughing is of infinite ſervice to land.

"For this reaſon it is, that land intended for wheat is ploughed three or four times before the grain is ſowed. Some farmers, who could not dung all their lands, ploughed part of them double the uſual number of times, and reaped greater crops from theſe, than from thoſe which were dunged. The expence of the ploughings extraordinary will be much leſs than the price of the dung neceſſary for the land, if the farmer is obliged to purchaſe it.

"In 1759, M. Delu gave three ploughings to ſome of his fields intended for oats; and though that year was very dry and unfavourable to ſpring corn, his oats kept up well till they were perfectly ripe, and yielded a full crop of excellent grain.

"He gave five ploughings to a piece of wheat-land which had not being dunged, and at harveſt, had taller and finer corn there, than in the neighbouring grounds which had been dunged and cultivated in the uſual way. In ſhort, the advantage of thorough tillage, while the plants are growing, is ſo great, that, in many places, it has been found amply to repay even the expence of digging between the rows of corn.

"The farmer muſt not think of practiſing the New Huſbandry in land which cannot be brought to a fine tilth: for as no remedies are proper for all diſeaſes, ſo no one culture can ſuit every kind of ſoil.

"I have met with very zealous huſbandmen, who have been in a great hurry to procure all the inſtruments proper for the horſe-hoeing huſbandry, before they had examined whether their ground was fit for uſing them. In walking over the fields, I have found them in ſo bad order as to be full of clods, ſtones, and all ſorts of weeds: only the bare ſurface of the land had been ſcratched, by what they called ploughing; and indeed their common inſtruments of tillage were ſo imperfect, that it was hardly poſſible for them to do more. I adviſed them to deſtroy thoſe weeds by good and frequent ploughings, to procure good inſtruments, to looſen the ground to a proper depth, to collect good manures, to drain their land well by trenches and ditches, and, in ſhort, to practice the Old Huſbandry completely, before they attempted the new; for, in fact, all the requiſites in the former muſt be the foundation of the latter.

"To anſwer the ends of this huſbandry, the ſeeds muſt be diſtributed ſo ſparingly, that each plant may have room to extend its roots in ſuch manner, that they may be able to collect an abundant quantity of food; each plant muſt be enabled to tiller greatly, ſo as to produce a conſiderable number of ſtalks; and each ſtalk muſt be enabled to bear a fine long ear, well filled with grains to its very point.

"To effect the firſt of theſe qualities, the field, after being thoroughly ploughed and well harrowed, muſt be divided by furrows, the ſpaces between which may be of ſuch breadth as ſhall be judged moſt proper; for neither their preciſe width, nor the diſtance between the rows of corn, is yet fully determined. In the middle of theſe ſpaces, which will be diſtinguiſhed by the name of beds; the wheat, or other grain, is to be ſown in one, two, or more rows. An inch will be ſufficient for the diſtance between the grains, lengthwiſe of the row; though that may be ſomewhat leſs, if the ground be not very good for

for wheat; or, on the contrary, ſomewhat more, if it be excellent for that grain. By this diſtribution, each plant will find, in the intermediate ſpaces between the beds, and in the beds themſelves, a ſufficient extent of earth wherein to collect its neceſſary food; for thoſe intermediate ſpaces, which I ſhall call alleys, muſt be wide enough to admit of ſtirring the ground in them while the plants grow: but to anſwer the ſecond and third intentions, it is of conſequence that theſe ſtirrings be performed at proper ſeaſons, becauſe each of them is to produce its particular effect.

"It is eſſentially neceſſary that the rows of corn be ſown very ſtraight; a circumſtance which, though it be attended with ſome trouble, ought not to diſcourage the huſbandman, becauſe the great difficulty will be only the firſt time. After the ground has been once rightly ſown, it will be eaſy to continue in the ſame regular tract every following year, without taking the precautions I am now going to obſerve.

"If the field be not very large, a furrow traced with a ſpade or pickax, directed by a line ſtretched acroſs the ground, will enable the ploughman to guide the horſe that draws the drill; and he will take care to leave a proper interval between one furrow and another, if three rows are to be ſown.

"If the extent of ground be too great for the above method, poles or ſtakes may be ſtuck, five feet aſunder, at each end of the field, to guide the ploughman, who, with a common plough, will trace ſmall furrows, by the help of which the horſe and drill may be properly directed.

"It will be right, if poſſible, to ſuit the direction of the furrows to the declivity of the land, that the water may drain down to the loweſt part of the field, where a ditch ſhould be dug to carry it off: and it will alſo be neceſſary, to make them lengthwiſe of the field, if convenient, that the leſs ground may be loſt by the ſpace which muſt be left for the plough to turn in.

"After the ſeed is put into the hoppers of the drill, the horſe which draws this inſtrument muſt be made to walk ſlowly in the furrow before traced by way of guide: and in order to drop as nearly as poſſible the intended quantity of ſeed, the outlet of the hopper muſt be proportioned to the ſize of the grain.

"As it will be ſomewhat difficult to manage the drill rightly at firſt, till the huſbandman becomes uſed to it, he ſhould look over his field as ſoon as the corn has ſprouted, and then drop by hand a few grains in the places where it may have failed.

"The land ſhould be ſown about the middle of September, or, at fartheſt, by the end of that month: and it will be right always to try the goodneſs of the ſeed beforehand, by ſowing fifty or an hundred grains of it in a fine mould, or moiſt ground, where it will ſoon appear whether they all riſe.

"Land which retains water ſhould be ploughed once in October, when the weather is fine. In doing this, a furrow ſhould be firſt cut in the middle of the alleys, and then it ſhould be filled with the earth on each ſide, even ſo far as to arch it up, and leave only a ſmall furrow on either ſide, cloſe to the beds, to drain off the wet, which would prove very prejudicial to the plants if it were to remain long near their roots. This looſening of the earth will alſo fit it for being mellowed by the winter's froſts; to which, however, care muſt be taken not to expoſe the roots of the corn, by leaving them too bare of mould. The moſt proper time for this ſtirring of the ground is when the plants have ſhot out ſome blades.

"The ſecond horſe-hoing, which ſhould be given as ſoon as the hard froſts are paſt, that is to ſay, by the end of March, is intended to make the plants tiller; and will have this effect, if, after the earth near the rows has been ſtirred a little, that which was before laid up in the middle of the alleys be returned back to the furrows at their ſides. This earth, having been mellowed during the winter, will afford excellent nouriſhment to the plants now beginning to vegetate apace, and they will ſoon put forth their multiplied ſtalks.

"The third hoeing, which is the ſecond after winter, and is intended to ſtrengthen the ſtalks, ſhould be performed when the ears of the corn begin to appear. This culture, which is looked upon as the leaſt important of all, and is ſometimes even omitted without any great inconvenience, need not be any thing more than a ſlight ſtirring of the earth, in which it will however be right to begin to hollow the alleys.

"The laſt ſtirring of the earth between the rows of corn is one of the moſt important, being that which makes the grains ſwell, and grow full bodied to the very point of the ear. The moſt proper time for this is, when the ears begin to bloom: but as the corn is then high, only one furrow can be cut in the middle of the alleys, the earth of which ſhould be laid up to the ſtem of the plants on each ſide. The plough will hardly be able to paſs more than twice in this furrow, which ſhould, however, be made as deep as poſſible, in order to bank up the greater quantity of earth. By this operation, the now fallow alleys are prepared for the next ſowing; for it is in the middle of them that the corn is to be planted the following year; and the now eared wheat is earthed up, to prevent its being lodged; though in general corn thus cultivated is leſs apt to be beaten down, than that which is raiſed in the common way, becauſe the ſtraw of this being more expoſed to the air, becomes harder and acquires a firmer texture, eſpecially toward its bottom. It is for this reaſon that a tuft of corn, which ſtands quite ſingle, is ſcarcely ever beaten down by the weather.

"Theſe repeated hoeings of the earth will certainly be rewarded with a very plentiful crop, unleſs the ſeaſons prove extremely bad.

"When the corn is reaped, all poſſible care ſhould be taken not to trample upon the adjoining ploughed ground.

"It is well known, that vigorous plants do not ripen their ſeeds ſo ſoon as thoſe which have been ſtinted in their growth: for this reaſon the corn cultivated according to the principles of the New Huſbandry, ripens later than in the common way, and ſhould therefore be ſown ſomewhat earlier.

"We will now ſuppoſe that the crop is reaped, and that the ſame field is to be ſown again with wheat the next year, and every year after, as it may be, becauſe the rows of corn are placed each time in the middle of the former alleys, which have been ploughed during the whole year, without producing any thing. Thus, the only difference between this new method of the old huſbandry is, that inſtead of reſting, or fallowing, a whole field, whilſt another whole field is under corn, and each of them

is ſeparate from the other, the fallow here is in the ſame field as the corn, being interpoſed by means of alleys, which is the part reſted between the beds, and is the part cultivated: but there is this great advantage here, that the ſtirring of the earth in the alleys, which are not planted, not only prepares the ſoil admirably for being ſown the next year, but invigorates the plants actually growing in the beds.

"If it be thought proper to dung the alleys, in order to prepare them for the reception of the ſeed, the dung, which ſhould be thoroughly rotten, muſt be laid in the bottom of the deep furrow before made in the middle of them, and there covered with the earth which was thrown up towards the rows of wheat. If the land does not want dunging, this deep furrow is filled up without it; and this ſhould be done immediately after harveſt, that there may be time to give the ground another ſtirring, which need only be a ſlight one, before the ſowing of the rows, which are now to be in the middle of the former alleys; and the alleys of this year will be in the place of the laſt year's ſtubble.

"Though land, cultivated according to the principles of the New Huſbandry, does not require ſo much dunging as that which is managed in the old way, yet this manure will always help to enrich the ſoil, eſpecially if it be uſed in the manner here directed. By being thoroughly rotten when it is laid in the furrow, and there covered over immediately after harveſt, it will have time to mellow and diffuſe its influence, and not be apt afterwards to choak up the ſhares of the drill; an inconvenience which does not happen with pigeons dung, which therefore need not be ſtrewed till the ground is ploughed for ſowing.

"It is farther obſerved:

"1. That if dung be uſed for the ſecond year's crop, very little of it will ſuffice, becauſe it need only be laid in the bottom of the furrows.

"2. That there can hardly be any occaſion for dung this ſecond year, becauſe, if the earth of the beds in which the wheat grew was good, that of the alleys, of the ſame ſoil, muſt be ſtill better, by reaſon of its having been fallowed and well tilled.

"3. That the ſecond year's wheat is placed in a moſt advantageous ſituation, its roots having a depth of twelve or fifteen inches to extend themſelves in, by means of the furrow which was in the middle of the alley. For this reaſon, corn ought to thrive beſt in thoſe lands which have been longeſt cultivated according to the New Huſbandry.

"The earth in the alleys is to be horſe-hoed during the ſecond year, in the ſame manner, and at the ſame ſeaſons, as in the firſt.

"This frequency of hoeing ought not to be objected to; for the labour of the firſt hoeing, to make the furrows on each ſide of the rows, and lay the earth up in the middle of the alleys, cannot be great; and the ſecond only returns that earth into thoſe furrows: the third is only to ſtir the ſurface of the ſoil: the fourth and laſt is to make the deep furrow in the middle of the alleys, and bank up the rows of corn on each ſide, with the earth taken out of it; ſo that neither of theſe operations ever extends to above a third part of the ground, at any one time.

"The whole field might indeed be ploughed up after harveſt: but I would adviſe the huſbandman not to touch the ſtubble then, becauſe the rows of that will help him to guide the drill in ſtraight lines, and the yet unrotten ſtraw might be apt to clog the ſhares of the drill, ſo as to prevent their working properly. However, if the ſtubble be very ſhort, this caution becomes the leſs material, and the whole field may then be ploughed; though ſtill it will be neceſſary to plough it again in October, in order to make drains to carry off the wet.

"It is almoſt needleſs to obſerve, that all the operations of which I have been ſpeaking, muſt often be performed either a little earlier, or ſomewhat later, according as the year is more or leſs forward; and that it will always be neceſſary to wait till the ground is dry enough to be ploughed without danger of its clodding; a circumſtance which varies greatly, according to the nature of the ſoil."

The editors of the laſt edition of Mr. Tull's Horſe-hoeing Huſbandry, give, in their preface to that work, the following comparative calculation of the expence and profit of the old method of culture and the new, drawn up by a gentleman who has practiſed both for ſome years, and who has no attachment to the New Huſbandry, farther than he has found it anſwer in his trials. They candidly appeal to experience, "whether every article in this calculation it not eſtimated in favour of the common huſbandry; whether the expence be not rated lower than moſt farmers find it; and whether the crop be not ſuch as they would rejoice to ſee, but ſeldom do.

"In the New Huſbandry, every article is put at its full value, and the crop of each year is computed four buſhels ſhort of the other, though, in ſeveral years experience, it has equalled, and generally exceeded, thoſe of the neighbourhood in the old way.

An Eſtimate of the Expence and Profit of Ten Acres of Land, in Twenty Years.

I. In the Old Way.

	l.	s.	d.	l.	s.	d.
Firſt year for wheat coſt 33l. 5s. viz.						
Firſt ploughing at 6s. per acre ——	3	0	0			
Second and third ditto, at 8s. per acre	4	0	0			
Manure, 30s. per acre ——	15	0	0			
——				22	0	0
Two harrowings and ſowings, at 2s. 6d. per acre ——	1	5	0			
Seed, three buſhels per acre, at 4s. per buſhel —— ——	6	0	0			
Weeding, at 2s. per acre ——	1	0	0			
Reaping, binding, and carrying in, at 6s. per acre ——	3	0	0			
——				11	5	0
Second year for barley coſts 11l. 6s. 8d.						
Once ploughing, at 6s. per acre —	3	0	0			
Harrowing and ſowing, at 1s. 6d. per acre —— ——	0	15	0			
Seed, four buſhels per acre, at 2s. -	4	0	0			
Weeding, at 1s. per acre ——	0	10	0			
Cutting, raking, and carrying, at 3s. 2d. per acre ——	1	11	8			
Graſs-ſeeds, at 3s. per acre —	1	10	0			
——				11	6	8
				44	11	8
Third and fourth years lying in graſs coſt nothing.						
So that the expence of ten acres in four years comes to 44l. 11s. 8d. and in twenty years to				222	18	4

	l.	s.	d.
First year's produce is half a load of wheat per acre, at 7l. per acre	35	0	0
Second year's produce is two quarters of barley per acre, at 1l. per acre	20	0	0
Third and fourth year's grass is valued at 1l. 10s. per acre	15	0	0
So that the produce of ten acres in four years is	70	0	0
And in twenty years will be	350	0	0
Deduct the expences	222	18	4
And there remains clear profit on ten acres in twenty years by the old way	127	1	8

II. In the New way.

First year's extraordinary expence is						
For ploughing and manuring the land, the same as in the old way				22	0	0
Ploughing once more, at 4s. per acre	2	0	0			
Seed, nine gallons per acre, at 4s. per bushel	2	5	0			
Drilling, at 7d. per acre	0	5	10			
Hand-hoeing and weeding, at 2s. 6d. per acre	1	5	0			
Horse-hoeing six times at 10s. per acre	5	0	0			
Reaping, binding, and carrying in, at 6s. per acre	3	0	0			
The standing annual charge on ten acres is	13	15	10			
Therefore the expence on ten acres in twenty years is				275	16	8
Add the extraordinaries of the first year, and the sum is				297	16	8
The yearly produce is at least two quarters of wheat per acre, at 1s. 8d. per quarter, which on ten acres in twenty years amounts to				560	0	0
Therefore, all things paid, there remains clear profit on ten acres in twenty years, by the new way				262	3	4

" So that the profit on ten acres of land in twenty years, in the new way, exceeds that in the old by one hundred and thirty-five pounds one shilling and eightpence, and consequently is considerably more than double thereof; an ample encouragement to practise a method whereby so great advantage will arise from so small a quantity of land, in the compass of twenty-one years lease; one year being allowed, both in the old and new way, of preparing the ground.

" It ought withal to be observed, that Mr. Tull's husbandry requires no manure at all, though we have here, to prevent objections, allowed the charge thereof for the first year; and moreover, that though the crop of wheat from the drill-plough is here put only at two quarters on an acre, yet Mr. Tull himself, by actual experiment and measure, found the produce of his drilled wheat crop amount to almost four quarters on an acre: and, as he has delivered this fact upon his own knowledge, so there is no reason to doubt of his veracity, which has never yet been called in question. But that we might not be supposed to have any prejudice in favour of his scheme, we have chosen to take the calculations of others rather than his, having no other view in what we have said, than to promote the cause of truth, and the public welfare."

A comparative Calculation of Expence and Profit between the Drill and the Common Husbandry, taken from Mr. Baker's Report to the Dublin Society of his Experiments in Agriculture, for the Year 1765. Published by Order of that Society.

An Estimate of the Expence upon a Plantation * Acre of Wheat, in the Common Husbandry.

	l.	s.	d.
To the first ploughing, commonly called breaking for fallow, 8 horses, 8s. 2 ploughmen, 1s. 4d. 2 drivers, 1s.	0	10	4
To the first harrowing, 4 horses, 4s. a driver 6d.	0	4	6
To the second ploughing, commonly called gaurowing	0	10	4
To the second harrowing	0	4	6
To the third ploughing, commonly called stretching	0	10	4
To sowing the seed, 8 horses, 8s. 2 ploughmen, 1s. 4d. 2 drivers, 1s. the seedman, 8d.	0	11	0
To seed wheat, one barrel	1	0	0
To rent for the year of fallow	0	18	0
To ditto, the year the crop is growing	0	18	0
	5	7	0

In this account 40s. are charged for 40 horses, imployed in the culture of one acre for wheat, in the common husbandry; a charge which ought to be considered by the farmer; for he actually buys and maintains his horses for this business.

The crop which follows wheat is generally oats; but sometimes peas are sown instead of oats; with some, the practice is to let the peas follow oats; in which case they fallow only every fourth year; but where land receives no other assistance than what arises from fallow, it is a bad practice not to fallow every third year. It is the general practice to plough but once for oats; and therefore it shall be stated so; but it is a much better practice to plough the wheat stubble once before winter, and again in the spring.

An estimate of expence upon an acre of oats.

	l.	s.	d.
To ploughing once	0	10	4
To seed oats, 2 barrels	0	12	0
To harrowing, 4s. 6d. seed-man, 4d.	0	4	10
To one year's rent	0	18	0
	2	5	2

These two crops consume three years; after which the farmer is to begin again, and to incur every article of expence stated in the above accounts, in order to obtain two crops more.

* An Irish acre contains 7840 square yards.

An Eſtimate of Expence upon a Plantation Acre of Wheat in the Drill Huſbandry, the firſt Year.

	l.	s.	d.	
To ploughing 4 times, to prepare the fallow -	2	1	4	This is the ſame charge as in preparing for the common huſbandry.
To harrowing twice for ditto ——	0	9	0	This is the ſame alſo.
To rent for the year of fallow —	0	18	0	This charge is ſaved after the firſt year.
To harrowing with the drill harrows —	0	0	6½	Four acres a day may be harrowed with one horſe.
To ſowing with the drill plough ——	0	1	1	From three to five acres may be ſown in a day.
To ſeed wheat generally 5 ſtone, but ſuppoſe 6	0	6	0	
To the firſt, or winter hoeing ——	0	1	7	Two acres may be hoed in a day, two horſes, plough-man and driver: the deſign of this hoeing is to leave the plants dry, and to meliorate the earth.
To the ſpring hoeing with the cultivator —	0	1	1	To deepen the ſoil, one horſe, plough-man, and driver.
To the third hoeing, i. e. to return the meliorated earth to the corn ——	0	1	7	To make the corn-tiller, i. e. to increaſe its branches.
To the fourth and final hoeing ——	0	1	1	To fill the grain, and render it large.
To rent, the year the corn is growing —	0	18	0	
	4	19	3½	

☞ Although the drill culture for the firſt year is very near as expenſive as the common; yet after taking the crop, the expence and labour of fallow, and the loſs of time, is not to be incurred again, as is unavoidable in the common huſbandry.

An Eſtimate of Expence upon an Acre of Drilled-Wheat after the firſt Crop.

	l.	s.	d.	
To ploughing the land once ——	0	10	4	One ploughing is all that is neceſſary.
To harrowing with the drill-harrow ——	0	0	6½	
To ſowing with the drill-plough ——	0	1	1	
To ſeed-wheat —— —	0	6	0	Be it remembered, five ſtone is enough.
	2	17	11½	Thus the land is ſown again with wheat every year, and inſtead of 4l. 9s. which is the farmer's expence in the common huſbandry, excluſive of one year's rent of the land: in the drill method is no more than 17s. 11½d. and the total expence, inſtead of 5l. 7s. is no more than 2l. 1s. 3½d. rent included; whereby there is a ſaving of 3l. 5s. 8½d. an acre.
To four times horſe-hoeing, as before ſtated -	0	5	4	
To one year's rent —— —	0	18	0	
	2	1	3½	

Before the account of profit and loſs upon theſe different methods of culture be ſtated, it will be neceſſary to take notice of an objection, which may perhaps be made to the above charge of ploughing in the common huſbandry.

It is pretended, that three quarters of an acre may be ploughed in a day, with one plough: but can it be done effectually? The land may indeed be ſcratched, but cannot really be ploughed as it ought to be.

The farmer ought to be cautioned againſt a trick too frequently practiſed in ploughing.

When a ploughman enters his plough and paſſes acroſs the field, he turns a ſod about a foot broad; when he is to return, he enters his plough about four feet diſtant from the outſide of the former furrow, and ſo turns another ſod of the ſame breadth, which, when turned, juſt meets the former ſod; thus four feet of the land appear to be ploughed, whereas the fact is, that the two feet lying under the ſods is not touched with the plough at all.

This deception, added to the practice of juſt ſkimming the ground, enables hirelings to undertake ploughing at ſix and ſeven ſhillings an acre.

But if a plantation acre of land be well and effectually ploughed, ten ſhillings and four-pence, as charged above, will not appear too much; and it is, in fact, ſupported by the common courſe of buſineſs.

When wheat is to be ſown, it is the general cuſtom to ſend a barrel of ſeed into the field with two ploughs, which is to ſow an acre of land, and that is the uſual day's work for two ploughs in the general courſe of buſineſs.

Let us ſee then, what the expence will amount to: eight cattle will be eight ſhillings, two ploughmen one ſhilling and four-pence; two drivers one ſhilling, and the ſeed-man eight-pence, which in all makes eleven ſhillings, and correſponds with the above charge.

One Acre of Wheat and Oats in the Common Husbandry, for fifteen Years.

Dr.		l.	s.	d.	*Per Contra*, Cr.		l.	s.	d.
To the expence on a wheat crop,	2d year	5	7	0	By the produce of wheat, 9 barrels,	at 20s.	9	0	0
To the expence on an oat crop,	3d year	2	5	2	By the produce of oats, 14 ——	at 6s.	4	4	0
To the expence on a wheat crop,	5th year	5	7	0	By the produce of wheat, 9 ——	at 20s.	9	0	0
To the expence on an oat crop,	6th year	2	5	2	By the produce of oats, 14 ——	at 6s.	4	4	0
To the expence on a wheat crop,	8th year	5	7	0	By the produce of wheat, 9 ——	at 20s.	9	0	0
To the expence on an oat crop,	9th year	2	5	2	By the produce of oats, 14 ——	at 6s.	4	4	0
To the expence on a wheat crop,	11th year	5	7	0	By the produce of wheat, 9 ——	at 20s.	9	0	0
To the expence on an oat crop,	12th year	2	5	2	By the produce of oats, 14 ——	at 6s.	4	4	0
To the expence on a wheat crop,	14th year	5	7	0	By the produce of wheat, 9 ——	at 20s.	9	0	0
To the expence on an oat crop,	15th year	2	5	2	By the produce of oats, 14 ——	at 6s.	4	4	0
		38	0	10			66	0	0
To clear profit in fifteen years	——	27	19	2					
		66	0	0					

One Acre of Drilled-Wheat, for fifteen Years.

Dr.		l.	s.	d.	*Per Contra*, Cr.		l.	s.	d.
To the 1st and	2d year's expence ——	4	19	$3\frac{1}{2}$	By the produce of wheat,	2d year, 6 barrels	6	0	0
To the ——	3d year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	3d year, 6 ——	6	0	0
To the ——	4th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	4th year, 6 ——	6	0	0
To the ——	5th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	5th year, 6 ——	6	0	0
To the ——	6th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	6th year, 6 ——	6	0	0
To the ——	7th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	7th year, 6 ——	6	0	0
To the ——	8th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	8th year, 6 ——	6	0	0
To the ——	9th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	9th year, 6 ——	6	0	0
To the ——	10th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	10th year, 6 ——	6	0	0
To the ——	11th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	11th year, 6 ——	6	0	0
To the ——	12th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	12th year, 6 ——	6	0	0
To the ——	13th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	13th year, 6 ——	6	0	0
To the ——	14th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	14th year, 6 ——	6	0	0
To the ——	15th year's expence ——	2	1	$3\frac{1}{2}$	By the produce of ditto,	15th year, 6 ——	6	0	0
		31	16	1			84	0	0
To clear profit in fifteen years	—	52	3	11					
		84	0	0					

To clear profit arising upon an acre of land in fifteen years in the Drill-Husbandry ——		52	3 11
To clear profit arising upon an acre of land in fifteen years in the common husbandry —		27	19 2
Greater profit on the drilled acre in fifteen years ——	——	24	4 9

Which amounts to 1l. 12s. $3\frac{3}{4}$d. *per annum*, for fifteen years on the acre, more than by the common husbandry.

In the drill-husbandry the crops are stated at three barrels of wheat less upon an acre than in the common husbandry, that it may not be supposed to be over-rated; but in the common husbandry, the crops are rated at the highest; fourteen barrels of oats an acre are also allowed in the comman husbandry, which every farmer must admit to be great allowance upon the general produce.

That the drill culture will produce six barrels an acre, is fully proved in Mr. Baker's report at large, which will shortly be published, where it will be shewn, that much more has been produced.

Doubtless it will be observed, that in fifteen years fourteen wheat crops are obtained in the drill-husbandry; in the common husbandry only five wheat and five oat crops; the other five years are not only lost, but are an heavy expence to the farmer.

A farmer having forty acres of tillage, supposing him to direct his attention to bringing it to the drill culture, would make in fifteen years 969l. 10s. more than he can in the common husbandry: which is such an advantage, that the greater profit in the drilled acre in fifteen years will purchase the fee simple of that in the common husbandry, at twenty-seven years purchase, valuing the land eighteen shilling an acre.

Thus it appears, that in every fifteen years the fee simple of all the tillage lands of the kingdom, is lost to the community by the common course of tillage.

In stating these accounts, no mention is made of fences, water cutting the land, weeding and reaping, as these articles of expence depend upon a variety of circumstances: but will, in general, be more upon the common husbandry than the drill.

M. de Chateavieux's *Account of the Crops produced during Sixteen ſucceſſive Years, by Fields cultivated and ſown in the common Way, and of which Part was conſtantly dunged; compared with a Crop of the ſame Feilds cultivated without Dung, according to the New Huſbandry.*

"The reſult of all our experiments in agriculture would be of little uſe, if it extended no further than our private inſtruction. To render it of more general ſervice, we ſhall here give a compariſon of the produce of lands cultivated according to the Old Huſbandry, and according to the New, that every one may judge which of the two is moſt likely to anſwer beſt.

"This parallel will ſhew how much the New Huſbandry is ſuperior in point of advantage to the Old. We are to ſuppoſe all the circumſtances of the ſeaſons to be like thoſe of the years of which we have compared the products. But as the expence of culture is an object well worth conſidering, and as that expence may not be equal in both ways, I beg leave to lay down here as a fact, "That the charge of the new culture is leſs than that of the old." I have tried it, and find it ſo; as I ſhall, hereafter, prove beyond deſpute.

"By the old culture, in the farm which I now cultivate in the new way, I ſhould have had but two fields ſown in 1752; to be reaped in 1753. Theſe two fields contain together eighteen acres, two roods, and twenty-eight poles. I have calculated their produce during ſixteen years, viz. from 1730, to 1745, incluſively. They have yielded, in that time, eight crops, the total produce of which has been 146863 pounds of wheat: deducting from which, 42130 pounds for the ſeed ſown in the eight years, the neat produce will be reduced to 104733 pounds.

It is proper to obſerve that this wheat was meaſured every year in the barn, as ſoon as it was threſhed, and before it was ſifted: an operation which always occaſions a conſiderable diminution, though we do not make any allowance for it here.

"Let us now ſee what crops the preceding experiments give us room reaſonably to expect from the ſame two fields in ſixteen ſucceſſive years of the New Huſbandry; to judge only by that of this firſt year, 1753, unfavourable as it is.

"The firſt field was ſowed, half in beds, and half in equally diſtant rows. I am obliged to ſuppoſe it to have been ſowed entirely in beds; for it cannot be doubted but that the part which was ſowed in rows, would have produced as much as the other: conſequently the whole crop of the two halves, at 3370 pounds each, would have been 6740 pounds.

"Beſides the advantge of reaping a much greater quantity of corn, there are others which highly merit our attention. This corn is not mixed with any ſeeds of weeds, and its quality is greatly improved by the abundance of nouriſhment which the plants are ſupplied with by the frequent ſtirrings of the earth in this huſbandry, more than in the old.

"But how fine a proſpect does the following propoſition afford us beyond all this! viz. "That the crops of the ſecond and following years, would be ſtill more plentiful than the firſt. What ſome might then think only an object of hope and ſpeculation, is already realized, and proved by experience. All this deſerves the moſt ſerious attention. The New Huſbandry will certainly, in time, acquire a ſuperiority over the Old, greater than we can now imagine.

Proofs that the beſt Field in the Country, though the greateſt Part of it was dunged, yielded leſs Wheat than thoſe in which no Dung was uſed. By M. de Chateauvieux.

"The proofs of the advantages of the New Huſbandry cannot be too greatly multiplied; and all thoſe which are the reſult of experience, deſerve to be communicated to the public.

"The field we are going to ſpeak of, is generally, and juſtly, reckoned the beſt in the country. Its ſoil is excellent, very deep, and extremely fertile. This field is dunged very often. Its nearneſs to the farm-yards renders the carriage of manure extremely eaſy, and is the cauſe of its getting perhaps more of it than may be neceſſary. Its ſituation too is excellent, riſing on all ſides above the neighbouring grounds, and the highways which ſurround it; by which means it is leſs expoſed to be hurt by wet, the water finding an eaſy drain from off it.

"The extent of this field is 6087 fathoms (four acres and eight poles.) It was ſowed in 1752, for the harveſt of 1753, and the greateſt part of it was well dunged.

"It is not the cuſtom of the place I am ſpeaking of, to deſcribe the extent of a field by the number of acres contained in it, but by the number of meaſures of wheat with which it is ſowed. Eight meaſures uſed generally to be employed to ſow this: but the quantity of ſeed was leſſened this laſt time, and only ſeven meaſures were ſown. We have hitherto ſuppoſed the ſurface of this field to be equal to that of the other fields of the ſame country, in which eight meaſures of ſeed are ſown.

"But as I was deſirous to be more preciſely exact, in order to form the compariſon I purpoſed making, I had recourſe to the geometrical plans of the lands, and found the contents of this field to be, as I ſaid before, 6087 fathoms; now, the cuſtom of the village to which it belongs is always to ſow at leaſt eleven meaſures in a ſpace like this. One field, among others, very near to this, and which is but twenty-four fathoms and thirty-two feet larger, has always been ſown with twelve meaſures.

"A new cauſe of the fruitfulneſs of this field, unknown before my obſervations, is, that the farmer wiſely took care to ſow it with a leſs quantity of ſeed. The plants throve better, when the land was not overſtocked with them. This field will therefore help to prove the truth of one of the firſt principles of the New Huſbandry, viz. that the quantity of ſeed generally uſed ought to be diminiſhed: a propoſition which deſerves our entire confidence, becauſe the ſeed here has, from time immemorial, been reduced to eight meaſures, and they have been ſufficient to produce very plentiful crops. The farther reduction made in 1752, to ſeven meaſures, muſt alſo be approved of, ſince the crop which theſe yielded was very fine.

Theſe preliminary obſervations ſeemed neceſſary, before we proceeded in our detail. This field was ſowed with about 850 pounds of wheat. It was finer during the whole ſummer than any wheat in the common way. It was reaped at a proper time, and yielded about 6646 pounds, from which muſt be deducted, firſt, the 850 pounds of ſeed: and, ſecondly, the value of the dung, which is equal at leaſt to 1200 pounds of wheat, together

ther with 2110 pounds; which deducted from 6646 pounds, the total produce, leave for the neat produce 4536 pounds.

"The crop of 1753 was diminiſhed by the hail on the third of June. The value of this loſs is not known; but we may fairly compare it with the experiment Numb. II. which likewiſe ſuffered by the ſame hail. We confeſs that this compariſon is not abſolutely exact, with reſpect to this accident; but it muſt alſo be granted, that this circumſtance cannot occaſion any very great error. We muſt likewiſe premiſe, that we ſhall not reckon the produce of a ſmall ſpot which is pretty commonly ſowed in March in the year of fallow, becauſe it hardly equals the expence of dung and ploughing.

"The neat produce on a field ſown in equally diſtant rows, was 2857 pounds eight ounces. But the extent of that field being only one acre, three roods, ſeven poles, and two yards, we muſt calculate what the crop would have been in proportion, if that extent had been four acres and eight poles (6087 fathoms) ſuppoſing it of the ſame quality. We ſhall find, that the field on which our experiment was made, would have produced neat 8006 pounds of wheat; deducting from which 4536 pounds, for the neat produce of the field cultivated in the old way. The difference in favour of the New Huſbandry, without dung, will be 3470 pounds of wheat.

"This field laid out in beds, yielded neat 1540 pounds of wheat. Its extent is but one acre, one rood, and eighteen poles; ſo that we are to ſee what crop it would have yielded if its extent had been four acres and eight poles, ſuppoſing the quality of the ſoil to be the ſame. The rule of three ſhews us again, that its neat produce would have been 5681 pounds of wheat, which we are to double for the amount of the next year's crop, every year yielding a crop in the New Huſbandry; whereas the field it is compared with would lie fallow this year. Thus two years will yield 11362 pounds of wheat; from which deducting 4536 pounds for the neat produce of the ſame field, cultivated in the old way, during the ſame ſpace of time, the difference will be 6826 pounds of wheat in favour of the New Huſbandry.

Reflections and Obſervations, on the Practice of the New Huſbandry, by M. de Chateauvieux.

"The chief object of our reflection laſt year was, the effect which ploughing and culture have upon plants. They ſeem to us to be confirmed by the following obſervations.

"1. The productions were greateſt in thoſe places where the earth had been moſt looſened, and brought to the fineſt tilth.

"2. We have ſeen plainly, that, in order to improve our tillage, it is neceſſary to make the great furrow in the middle of the alleys very deep, becauſe that furrow being afterwards filled up, and a new bed made over it, there is a greater depth of light well looſened mould immediately under the roots of the plants.

"3. We can affirm, that we have this year, without much trouble ploughed our beds from fifteen to eighteen inches deep, which is very conſiderable; but we muſt not flatter ourſelves, that this depth can always be attained the firſt year; it is by continuing this ſame culture that we ſhall inſenſibly reach it.

"4. To have great ſucceſs, requires proper care and judment in performing ever part of the New Huſbandry. The culture which is well executed, will be of very great uſe; but that, on the contrary, which is badly done, will be of no ſervice to the plants, and may even prove very detrimental to the next year's crop.

"5. To perform this culture with advantage, it is therefore neceſſary to obſerve this important maxim of tillage, ſo little attended to by many farmers, "never to ſet the plough to work, when the earth is too moiſt." I have adhered to it ſtrictly, and have never ſuffered my lands to be touched till they were dry. We have tilled when the weather has been very dry and very hot, and then it was that our culture had the beſt effect; the ſtiffeſt land having been broken by the preceding ploughings, was provided with the moiſture neceſſary for plants, from its ſurface to the bottom of the furrows; and the plants were ſenſibly benefited by all our frequent ſtirrings.

"6. I was ſo ſtruck with this, that I marked ſeveral ſtalks, to ſee how much they grew each day. From the time that the ears began to appear, till they had done bloſſoming, I found that they grew an inch in four and twenty hours. The hotteſt days were thoſe in which the ſtalks grew moſt, whilſt all vegetation ſeemed almoſt ſuſpended in the wheat in the common way.

"7. This obſervation led me to another. I was greatly ſurpriſed one day to find my ſtalks juſt as I had left them the day before. The next day, and the day after, I found them ſtill the ſame. In ſhort, they grew no longer from that time.

"So ſudden a change raiſed my curioſity greatly, and I reſolved to find out the cauſe of it. The time when they ceaſed to grow, was immediately after they had done bloſſoming. I judged that from that time all the ſap was conveyed to the ear, to form the grains, and that the reſt of the plant had only what was neceſſary to prevent its drying too ſoon. This diſpenſation of the nutritive juices ſeemed to me very remarkable: all their forces ſeem then to unite, in order to form, fill, and ripen the grain, which is the moſt uſeful part. I was afterwards confirmed in this, by obſerving, that it was from that very time that the ſtalks and blades began inſenſibly to loſe their deep green colour, and that this green grew lighter and lighter every day; a ſure ſign of a diminution of ſap in thoſe parts.

"8. It is likewiſe of very great importance to know which is the moſt proper time for ſowing; for the growth of plants depends greatly on this circumſtance. Late ſowings have not anſwered; but the early ones have produced plants, whoſe vigour has enabled them the better to reſiſt the winter's cold, and to branch out the more abundantly. By attending to this circumſtance, the farmer will enjoy the deſirable advantage of having his corn ripen early, and of its being leſs expoſed to the dangers of the ſummer ſeaſon; for we have ſeen that the wheat which was ſowed firſt in the new method, ripened thoroughly as ſoon as that which was ſowed in the old way. It is proper to know this, in order to be ſenſible of the neceſſity of beginning to plough early, that the ſeed may be ſowed in due time.

"9. I muſt beg leave again to make a few reflections relative to the quantity of ſeed moſt proper to be ſown. It is of the utmoſt importance to know how to proportion

tion the quantity of the ſeed to the ſtrength and richneſs of the ſoil, ſo that each may have its due proportion. The experiments already made, help to direct us; but I think others ſtill neceſſary, before we can truſt abſolutely to our knowledge in this point.

"At preſent I ſhall only adviſe ſowing the ſame quantity of ſeed as I did in 1752. I fancy that proportion will not differ greatly from what a longer practice will ſhew to be beſt. However, the ſame quantity of ſeed will not do for every ſoil. It muſt be varied with judgment, and regulated according to the circumſtances of the ſeaſon, and the better or worſe condition of the land. I think, too, that in the firſt, and even the ſecond year of the trials which may be made, it will be proper to ſow a little thicker than I did in 1752. The farmer will eaſily perceive, that when his lands are well looſened and brought to a good tilth, they will require leſs ſeed; but till then, he will do well not to be over-ſparing of it.

"10. We cannot yet determine ſo exactly as we could wiſh, what breadth the beds, including the allys, ſhould be of, to make the ground produce the greateſt quantity of corn; nor whether it would be beſt to ſow more or leſs than three rows. We confeſs, that we ſhould be glad to ſee a longer ſeries of accurate experiments, and to have a greater knowledge of this matter before we pretend to fix it. Our beds have always been about ſix feet wide.

"M. Duhamel, who firſt introduced this New Huſbandry in France, intends to make experiments by ſowing only two rows. If they ſhould yield more grain, the breadth of the beds may certainly be diminiſhed: and as it is of conſequence to multiply and vary experiments, in order to determine this point, we now have ſeveral beds ſown, ſome in two, and ſome in three rows. I have likewiſe tried what multiplying the number of rows in ſome fields would do; and the reſult of this experiment promiſes an advantage in that way of ſowing. The ſucceſs of this firſt trial was as follows.

"When the field was ſowed, I obſerved, among the reſt, ten beds which the ploughman had made wider than the others. I was ſorry at firſt, that any part of the ground ſhould be loſt; but, upon ſecond thoughts, I determined to ſow thoſe beds with two turns of the drill-plough; and conſequently to plant them with ſix rows of wheat. I did ſo; and when the firſt ploughing after winter was given, little regard was paid to the two outſide rows, which were torn up by the plough in ſeveral parts; ſo that there remained but four or five rows in thoſe places.

"The wheat of theſe beds, not excepting even the middle rows, grew as high, and branched as much as that of the others, in which there were but three rows. I examined them frequently with great care, and was aſſiſted therein by ſeveral perſons, very capable of judging and making good obſervations. The only difference we could diſtinguiſh, and that was ſcarcely perceptible, was in the ears, which we thought rather ſhorter in the middle rows than in the others: but as there was a greater quantity of them, we judged that theſe beds would yield the moſt grain.

"We were not miſtaken; for their produce was as follows; the ten beds, ſown with ſix rows each, yielded ninety-one pounds of wheat more than ten beds ſown with three rows each. But as this reſult does not ſet the matter in a ſufficiently clear light, we muſt have recourſe to the following calculation. The ſix rowed beds took up more ground than thoſe which had but three rows: two beds more might have been made out of the ſurplus of their breadth; ſo that there would, in that caſe, have been twelve beds inſtead of ten. The queſtion therefore is, whether this ground, made into ten beds, produced more than it would have done if it had been made into twelve beds of three rows each. To which I anſwer, that it did produce thirty-eight pounds more; and that there was likewiſe a ſeventh part more ſtraw.

"As this experiment deſerved to be repeated, I have tried it in a larger way. I have laid ſeveral acres out in beds of about ſeven feet wide: they are ſown with ſix rows: the plants are very fine, and I impatiently wait the event.

"Though I have continued not to dung my fields, the plants ſtill grow very tall, and produce fine long ears, well filled with plump grain.

"I am indebted to the New Huſbandry for the recovery and improvement of worn-out meadows. They have already yielded me plenty of fodder, the value of which ought to be added to the produce of the fields, becauſe the New Huſbandry is the immediate cauſe that manure can be ſpared to enrich thoſe meadows.

General Diſpoſition of the Lands for the Crop of 1754.

"The more I have ſtudied the principles of the New Huſbandry, the more I have been convinced of the advantages attending it. My experiments have not only confirmed me in this opinion; but they have likewiſe ſhewed me, that my practice has been conſiſtent with thoſe principles. This made me determine to lay the whole of one of my farms out in the new way, as ſoon as I poſſibly could; its extent being no more than I can direct almoſt the whole culture of myſelf.

"I have compleated it this year. All the fields, of which only half uſed to be ſowed every year in our old way, are now laid out in beds. I have ſowed them all, with a deſign to continue doing ſo for the future every year. They look exceeding well hitherto: the plants are extremely fine, and promiſe a greater crop next year, than that of the experiments of the foregoing years.

"Theſe experiments have likewiſe made a ſtrong impreſſion on ſeveral perſons in this country, each of whom judged of the New Huſbandry, as his inclination, or proſpect of advantage, directed. It is true, our farmers are more generally inclined to ſow their lands in equally diſtant rows, with the drill-plough, than to lay them out in beds; the proper management of which, ſay they, is attended with much more care and trouble. My drill-plough is preferred on account of its ſimplicity. It began to be uſed laſt year, and numbers of fields near this city (Geneva) have been ſowed with it this year.

"Several of our peaſants have likewiſe tried the drill-plough, and their example will be of conſequence hereafter. There unwilligneſs to come into any new practice is well known: but this ſeems to get the better of their prejudices; and the proſpect they now have of greater crops than uſual, makes them regret their not having ſowed a larger extent of ground in this manner.

"We have about an hundred and fifty acres ſowed in beds, and alſo near a thouſand ſowed in equally diſtant rows. Such large experiments, and made on different ſoils, cannot but afford new inſtruction: the facts will be better aſcertained, and people will be more thoroughly convinced

convinced that the greater product of the crops is owing to the New Husbandry, and not to favourable circumstances, to which they are too apt to impute it. These experiments, say they, have been made on the very best soils; it is much easier to prepare two or three roods of ground, than an extent of several acres; these little spots have been cultivated with vast care; it is almost impossible to bestow the same attention upon large tracts of land.—Luckily, several lovers of agriculture are making large experiments, which already prove, that the New Husbandry may easily be practised in any extent of ground whatever.

CONCLUSION.

"Any one may now judge, by the experiments which have been made these last four years, and by the success which has attended them, how far the principles of the New Husbandry are justly founded, and how far we are in the right road to give still farther demonstrations of its excellence.

"The lands on which it has been already practised, leave no room to doubt that all its operations may be performed with ease: and at the same time they prove to those who shall be inclined to cultivate any part of their farms in the same way, that they may do it with equal advantage.

"Convenient instruments for executing this culture are already invented and made. The use which has been, and still is, made of them, ought to increase our confidence in them. It is by their means that the two most essential articles towards securing success, are obtained: the first is, the means of forming, ploughing, and cultivating the beds, with great ease and little expence: the second, that of sowing land more regularly, and of giving it the exact quantity of seed that may be thought most proper, by means of the drill plough, which buries the seed at its proper depth in the furrows, covers it over, and, in short, performs the whole business of sowing, with a great dispatch, and a considerable saving of seed.

EXPERIMENTS *made near* Guignes, *in the Province of* Brie, *under the Direction of* M. Rousseel, *and communicated to* M. Duhamel *in* 1755.

"M. Rousseel prudently began, as we would advise every one to do, with small experiments. His first trial of the New Husbandry was upon a little spot: but being prevented from attending to it in person, many faults were committed during his absence. On his return, which was towards the end of November, 1754, he inquired after his crop, and learnt with pleasure, that some grains had produced upwards of sixty ears a-piece, and that many of these ears contained sixty-four grains. This was sufficient to shew him the excellence of the new culture, which he immediately determined to extend to larger objects.

He had no time to lose. Two contiguous pieces of ground, containing twenty-four acres, had been folded, and were just going to be ploughed for the last time, in order to be sown according to the usual practice of the country. These were chosen for the farther trial of the New Husbandry, and were accordingly sown with the drill-plough, between the ninth and twenty-first of October, with 571 pounds of wheat, including ten pounds and a half, which were used to fill up some spaces where the seed had missed. This is after the rate of about twenty-four pounds to an acre.

At the same time, an adjacent piece of ground, which had been folded like the former, and of which the soil was equal to the best part of the field sown in rows, was sowed in the common way. This last contained four acres and a half, and took up 486 pounds of seed, which is 108 pounds to an acre.

The corn came up finely in both fields: but that which was sown in rows happened to be near a wood, from which numbers of rabbits came, and entirely destroyed the plants of near five acres: the roots which they left were eaten up by worms: and the dung of the sheep-folds produced a great quantity of weeds. This was not all: as the furrows did not run in the direction of the declivity of the ground, the water lodged in them, so that the first ploughing, which ought to have been given in March, could not be performed till April, when it left a great many clods.

These clods were grown hard by the time of the second ploughing, which was performed with a plough with two mould-boards, which instead of breaking and loosening the ground, and laying fresh earth to the roots, only turned those hard clods over upon the rows.

The third ploughing, which was given with a plough with two shares, and in more favourable weather, had a better effect.

Notwithstanding the accidents which had reduced this piece of wheat to so wretched a condition, that the husbandmen said they were sure it never would produce a crop worth reaping, and that all the labour bestowed upon it was thrown away; yet, reckoning upon the same footing of twenty-four acres, though it would be but just to deduct the five which were absolutely destroyed by the rabbits; and supposing too the crops of 1756 and 1757 to be no greater than that of 1755; M. Rousseel's calculation proves, that even these three crops will still be better than what the same field would produce in the common way.

But, says M. Rousseel, if we do the New Husbandry part of the justice it deserves, and instead of including the five acres which the rabbits destroyed, we reckon only the produce of nineteen acres prepared in a hurry, and badly ploughed; and even suppose them to be no better managed in the following years, and the whole extent of the 24 acres, to be only of the same quality as the four acres and a half with which it was intended to be compared, the produce of both, in three years, will be as follows.

The nineteen acres produced 11592 pounds of wheat, which was preferred to any other for seed, not only because it was finer, but likewise because it was quite free from all seeds of weeds. This is after the rate of 610 pounds for every acre.

From this we are to deduct the seed, which is, for each acre, twenty four pounds.

The neat produce of each acre will then be 586 pounds of wheat, free from all seeds of weeds.

Supposing the crops to be no greater in the following years, though what we shall say hereafter will shew that they certainly will, each acre will have produced neat at the end of three years, 1758 pounds of wheat.

The other piece of ground, which was cultivated in the

the old way, in order to make the compariſon, produced 1260 pounds an acre, from which we are to deduct 154 pounds for the ſeed.

The remaining neat produce is 1106 pounds.

The ſecond year's produce of this ſame acre, ſowed with ſpring corn, can be reckoned at only half the value of the firſt year's crop of wheat; and the third year produces nothing, being the year of fallow.

Thus the total neat produce of the acre cultivated in the common way will be, at the end of three years, only 1659 pounds; whilſt that in the new way will be 1758 pounds."

M. Rouſiel *gives the following Account of his Experiments in* 1756, *in a Letter to* M. Duhamel.

"In October 1755, I choſe, in the middle of a fallow field which had been well ploughed, and was not expoſed to any of the accidents I met with laſt year, a piece of ground, which, to make a fair compariſon between the new method and the old, I divided into two equal parts, each containing twelve acres. One of theſe ſpots, as ſet apart for the New Huſbandry; and the other, exactly of the ſame quality, and quite contiguous, to be ſowed broadcaſt in the old way.

"This laſt ground had been extremely well dunged by the folding of the ſheep. With regard to the other, which was to be cultivated in the new way, and which compoſed ninety-three beds five feet wide, including the alleys; only eight of theſe beds were dunged by ſheep, and that at the ſame time, and to the ſame degee as the ground by which the compariſon was intended to be made: of the other beds, ſeventy-ſix had no ſort of dung or amendment whatever; and nine were dunged more or leſs, in the manner and proportion hereafter mentioned.

"Moſt of thoſe who practiſe the New Huſbandry uſe no dung at all. I ſuppoſed that their reaſon for rejecting this manure was, the difficulty of finding a proper time to apply it; for whilſt their alleys receive their ſeveral ſtirrings, no wheel-carriage can be admitted with dung without hurting the beds which are ſown, and hardening the looſe mould of the alleys: to carry it on the backs of cattle would be at beſt a very difficult, tedious, and expenſive way, where any conſiderable ſpace is to be dunged: to ſpread it upon the earth only the moment the ſeed is ſown, is a ſure way to clog up the drill-plough, and hinder its operation, if the dung be not thoroughly rotten; and to breed weeds, which by no means ſuit this culture. To remedy theſe inconveniencies, I contrived the following method. I opened in each of the alleys, one of thoſe large furrows which muſt always be every year at the concluding of the ſummer hoeings, in the place where the three rows of ſeed are afterwards to be ſown; and by drawing the plough with two mould-boards once through it, I made it fourteen or fifteen inches wide; which is the breadth that the three rows of ſeed require. The ſpace between two of theſe deep furrows is exactly the breadth of a cart, the wheels of which going in them, hurt no part that has been ploughed, and do not preſs down or harden the looſe mould; nor do the horſes do any damage, becauſe they neceſſarily tread upon the ſtubble of the late reaped beds, in the middle between theſe two furrows. This was the method I uſed to dung the nine beds in queſtion. The dung was well rotted: it was ſpread at the bottom of the furrows, and immediately covered over by the ſame ploughing that made the beds which were ſown ſome days after. Perhaps this manure may be of more ſervice to my lands than to many others, becauſe the ſoil is naturally cold and backward. The grain is by this means ſown upon a kind of gentle hot-bed, the warmth of which promotes the branching and vegetation of the plants. The winter rains and froſts raiſe a fermentation. The firſt ſpring ploughing, by giving it a little air, revives that fermentation at the very time when the ſap is moſt active, and the plant begins to branch. As the dung rots, a kind of motion is cauſed in the earth, which in ſome meaſure anſwers the end of a ſlight ploughing, and brings freſh nouriſhment to the roots. The ſame heat as conſumes the ſtraw, likewiſe conſumes the little ſeeds that are in the dung, which might otherwiſe produce numbers of weeds. When this dung is brought up again to the ſurface of the earth, by the next year's ploughings, it will no longer have thoſe hurtful ſeeds. It will indeed have loſt its heat; but it will ſtill have retained all its fatneſs, which will mix with the earth; and land thus conſtantly dunged, will in time become a perfectly fine mould. But if theſe layers of dung ſhould be ſpread too thick, or the dung itſelf be of too hot a nature, the roots of the corn might perhaps be endangered thereby. It was to determine this that I tried the following experiments, to know the effects of different dungs, and what quantity it is proper to employ.

"Three beds were dunged, in the above manner, with horſe-dung; the firſt, which was 1165 feet long, had three loads of dung; the ſecond, of 1171 feet, had but two and a half; and the third, 1183 feet, had but two. Three other beds were dunged with cow-dung: one of 868 feet, with two loads and a half; and the ſecond, of the ſame length, with two loads; and the third, of 874 feet, with only one load and a half. The three remaining beds had ſheep's-dung: the firſt, of 842 feet, two loads; the ſecond, of 838 feet, one load and a half; and the third, which was of the ſame length, one load.

"Theſe beds were diſtributed in ſuch a manner, that each of them was in the middle of two other beds which were not dunged. The field, thus laid out, was ſown on the thirteenth, fourteenth, fifteenth, and ſixteenth of October, with the drill-plough, which plants three rows in each bed. I uſed 378 pounds of ſeed; and afterwards ten pounds to fill up the chaſms; which is after the rate of thirty-two pounds ſix ounces to an acre, and conſequently a little too much. Accordingly, when the corn came up, I ſaw it was too thick ſown. The reaſon was, that the grain was too ſmall in proportion to the outlets of the drill-plough. At the end of ten days this corn roſe well. On the eighteenth of December, I obſerved that moſt of theſe plants had branched into four ſtalks, whilſt thoſe in the common way had but three. I perceived no ſenſible difference then between the dunged and the undunged beds. It was not till the twenty-fourth of January that I ſaw plainly that the plants of the dunged beds were of a deeper green, and had made longer and more vigorous ſhoots than thoſe of the undunged beds. By the twentieth of February, five ſmaller ſtalks iſſued out of the five great ones, which was not the caſe with the wheat in the common way. The alleys did not receive their firſt ploughing till the 10th of March. Eleven of the main ſtalks grew an inch and an half in five days; and I obſerved that the moles were rather more buſy

busy in the dunged beds than in the others. As the earth was yet somewhat too soft, I thought it needless to continue a ploughing which could not do any good, and therefore postponed it to the 28th of March, and following days. On the 9th of April, I found a plant with eighteen stalks in one of the dunged beds: the greatest number of branches that any of the plants in the undunged beds had, was twelve: but, on the other hand, I likewise found some which had eighteen in the field of comparison sown in the common way.

"On the 9th of May, this same plant had twenty stalks; and from that time it branched no more. The second ploughing was not given till three weeks after, viz. the 28th of May; which, I think, was somewhat too late after the corn had ceased to branch. By the 23d of June there were three sorts of wheat to all the beds: there were ears in blossom, others just going out of bloom, and others not yet out of their hoods. The finest ears were those which came up and blossomed first. The most forward beds were those which had been dunged under furrow with sheep's-dung: the next to them were the eight beds which had been folded, the plants of which were a little greener than those of the undunged beds.—The last ploughing was given on the tenth of July. The grain had then begun to fill: but that in the common way was the most forward, though it was sowed three weeks later than the other. I know not for what reason, the wheat of the New Husbandry began to be reaped on the 4th of August, and that in the old way was let stand till the thirteenth. The produce of both cultures was as follows.

In the twelve Acres cultivated in the new Way, the three Beds dunged with Horse-Hung, yielded,

	Sheaves.
The first, 1165 feet long, dunged with three loads	19
The fellow to it, not dunged, — —	15
The second, 1171 feet long, dunged with two loads and a half, — —	18
The fellow to it, not dunged, — —	14
The third, 1183 feet long, dunged with two loads	16
The fellow to it, not dunged, — —	13

The three Beds dunged with Cow-dung, yielded,

The first, 868 feet long, and dunged with two loads and a half, — —	16
The fellow to it, not dunged, — —	11
The second, likewise 868 feet long, and dunged with two loads, — —	15
The fellow to it, not dunged, — —	12
The third, 874 feet long, and dunged with one load and a half — —	14
The fellow to it, not dunged, — —	12

The three Beds dunged with Sheep's-Dung, yielded,

The first, 842 feet long, and dunged with two loads	17
The fellow to it, not dunged, — —	10
The second, 838 feet long, and dunged with one load and a half — —	15
The fellow to it, not dunged, — —	11
The third, also 838 feet long, and dunged with one load — — —	14
The fellow to it, not dunged, — —	10

The eight Beds which had been folded, two of which were

	Sheaves.
1171 feet long, three 1177 feet, and three 1183, produced in all — —	142
This is near 18 sheaves a-piece.	
The 67 other beds, which had not been dunged, produced in all — —	814
This is somewhat more than 12 sheaves a-piece.	
Total produce of the 12 acres cultivated in the new way, — —	1208
The twelve acres sown in the common broad cast way, after having been well folded all over, produced — — —	1820

"These facts shew the advantage of dunging in this manner. It is plain that the best dung is that of sheep, and that it is more profitable when laid under furrow, than when it is spread upon the surface of the ground by folding.

"In proportion to the produce of the bed 842 feet long, which was dunged with two loads of sheep's dung, and produced seventeen sheaves; the bed 1165 feet long, which was dunged with three loads of horse-dung, and produced only nineteen sheaves, would, if dunged with sheep's-dung, have produced $23 + \frac{69}{133}$; and the bed dunged with cow-dung, which yielded but sixteen sheaves, would have yielded $17 + \frac{68}{133}$.

"The eight folded beds, whose whole length was 9412 feet, would have yielded 190 sheaves $+ \frac{43}{133}$, instead of only 142 sheaves, which was the amount of their product.

"It is likewise plain, that if the whole of my twelve acres in the new way had been dunged with sheep's-dung, as the bed 842 feet long was, I should, in the same proportion, have reaped 1700 sheaves, which would be but 120 sheaves less than the whole produce of the twelve acres folded all over, and sown in the broad-cast way. But even then, I say, that those 120 sheaves, would not be equivalent to the quantity of grain which I saved by sowing according to the New Husbandry. An hundred of our sheaves yielded, in general, little more than 378 pounds of wheat. The 120 sheaves which the twelve acres sown in the broad-cast way produced more than the twelve acres in beds, would therefore yield but 453 pounds. Deduct this from 871 pounds, which I saved in the seed of these last twelve acres sown in the new way, and I shall still be a gainer: for I sowed only 388 pounds in this ground; whereas 1260 pounds were used to sow the other twelve acres in the common way. This would have been the produce of this first year's crop, supposing that the whole of my twelve acres in beds had been dunged in the same manner as the bed 842 feet long. For want of that, I reaped but 1208 sheaves. They have just been threshed, and have yielded only 5040 pounds of grain."

M. Du Hamel makes the following remarks on this account of M. Rousseel.

"The 1208 sheaves yielded but 5040 pounds of grain, from which we are to deduct 388 pounds for the seed.—The neat produce is therefore 4652 pounds, which would make in three years 13956 pounds. The other field in the common way produced 8757 pounds; from which we are to deduct 1260 pounds for the seed: the neat pro-

duce is consequently 7497 pounds; the half of which is 3748 pounds and an half: for the value of the next year's crop. This is all that the twelve acres in the common way would produce in three years, and amounts to no more than 11245 pounds and a half: consequently the balance in favour of the New Husbandry in three years, is 2710 pounds and an half, or one fourth part of the whole: and that from a field which was sown in rows for the first time, and of which three-fourths were not dunged at all: whilst the other, with which it is compared, had been folded all over, and for the year, produced a very plentiful crop."

Extract of a Letter from a Gentleman in Poitou.

"Being convinced of the advantages of the new method of cultivating land, I resolved to make a trial of it, by comparing the produce of a field cultivated in the common way, with that of another field cultivated according to the New Husbandry: and M. Du Hamel has desired all lovers of agriculture to try by experiments made with care, whether it be most profitable to sow beds with two, or with three rows of corn; or, which is the same thing, to find at what distance the rows ought to be sown; I divided a spot of ground into ten equal parts, which I made into as many beds, each six feet wide.

"In the middle of five of these beds, I sowed three rows, seven inches asunder; so that they took up fourteen inches of ground, and there remained four feet ten inches for the breadth of the alleys, which is very sufficient for the horse-hoeing husbandry.

"I sowed three other beds with only two rows, a foot distant from each other; consequently the alleys were five feet wide.

"The two remaining beds were sown with two rows each, three feet asunder. The alleys were therefore but three feet wide: or rather the whole of this last spot may be looked upon as sown in single rows, with alleys three feet wide, which is too narrow a space to admit of horse-hoeing them conveniently.

"Before I speak of the produce of these beds, it will be proper to observe—

"1. That this trial was made with rye. My fear that birds might eat up the wheat, made me prefer rye, which I advise every one to do, when only small experiments are made. This escaped without the least damage; whereas I have observed, that when experiments have been made with wheat, the birds, preferring that to any other grain, have always destroyed a considerable part of the crop.

"2. The beds sown with three rows were near a hedge, which greatly damaged two of them, either by its roots exhausting the ground, or by its shadow keeping that part harder frozen than the rest.

"3. The intervals were not hoed at all, between either the double or the triple rows; only the alleys were horse-hoed; and consequently none but the single rows were hoed on both sides.

"4. On the 25th of February, the alleys were ploughed. I visited them on the second of March, and found, upon examining the plants, that, in these five days, they had shot out roots four inches long into the new stirred mould. I repeated the hoeings at proper times, and the rye continued in good condition till it was reaped. The last hoeing was given after the blossoming was past.

"5. I then examined the roots, and found they had extended eighteen inches into the loose mould. This may seem strange; but I am certain it is true; for I took every precaution not to be deceived.

"6. The alleys between the single rows were hoed but twice, being too narrow to admit the plough after the plants had begun to branch. However, I had not reason to complain of the produce of these single rows.

"Having now given an account of my operations, it is time to speak of the products.

"The ears in my rows were from four to seven inches long, and the stalks from four to six feet high, which was one third taller than in the neighbouring fields, cultivated in the old way.

"This spot of ground, in the best years, never produced more than five bushels, including the bushel of seed corn; for that was the quantity generally used: in common years, it has not yielded above four bushels, and frequently much less. We therefore cannot reckon its produce, one year with another, at more than four bushels, including all faulty grains and seeds of weeds, which fall through the sieve, and remain mixed with the good grain. This year it has yielded me seven bushels of fine clean rye, considerably larger than the common sort. I make no account of the seed, the quantity was so small.—To prevent this grain's being mixed with any other, and at the same time to judge more exactly of the produce of my ground, I had the sheaves threshed out close by the field; but it was in the middle of a road, where all the grains scattered by the flail could not be gathered up; by which I reckon I lost more than the amount of the seed that was sown in the rows. The produce of my little field was therefore this year, compared to other years, as seven is to four; to which must be added, that it is capable of bearing as great a crop every year, which is not the case of the common husbandry.

"Let us now examine the produce of the rows, and compare them with one another, in order to judge whether it be most profitable to sow in single, double, or triple rows.

"Two beds, the most distant from the hedge, sown with triple rows, yielded each three quarters of a bushel.

"Two beds with double rows, yielded each two thirds of a bushel; consequently the three beds with double rows yielded two bushels, and the six rows sown two and two, in three beds, yielded one quarter more than the six rows sown three and three in two rows; but two beds of three rows a-piece, yielded one ninth more than two beds of only two rows a-piece; whence we may conclude, that the distance of the rows increases the product of an equal number of plants; or, which comes to the same, that an equal quantity of seed will produce more grain when the rows are more distant, than when they are sown closer together. But this is not a real profit; because the six double rows take up one third more ground than the six triple rows.

"Each of the single rows yielded seven-eighths of a bushel, which is one seventh more than the triple rows, though they took up no more ground; and their produce would probably have been greater, if they had been hoed two or three times more.

"It appears by this account, that the profit would probably have been on the side of the double rows, if the alleys had been made only four feet wide, instead of five; for

for by this means I ſhould have gained one fifth more ground; and four feet are a ſufficient breadth for the operations of the horſe-hoe. Where the ſingle rows are ſo near as in this experiment, the ſame ground would ſcarcely bear another crop the next year, for want of having been ſufficiently ſtirred. To clear up this point by a new experiment, I have ſown ſingle rows in the middle of four beds, two of which are four feet wide, and the two others only three. The winter hoeings have been given them with eaſe, and I hope the others will not be more difficult, at leaſt till all the corn is ſpindled. What I fear moſt is the earth's being carried off the narrow ſpace on which the rows ſtand, when a thaw comes on, or by the heavy rains which are frequent with us.

"The reſt of my field is ſowed in two rows, in beds four feet two inches wide. I have done this, becauſe, as it is the general cuſtom here to make our ridges about that breadth, I am in hopes that if I obtain a plentiful crop, I ſhall be able the more eaſily to prevail on the farmers of this country to adopt a method, the advantages of which I am ſenſible of, before I tried the above experiments."

As it will doubtleſs be expected by our readers, that the advantages reſulting from both the Old and New Huſbandry ſhould be ſet in the cleareſt and moſt conſpicuous point of light under this article, we ſhall add here two calculations that lately appeared in the Muſeum Ruſticum, and appear to be made with great accuracy and candor.

The Profit attending Arable and Paſture Land compared, as found by Experience, near Bury, *in* Suffolk.

"The following calculation of the different profit attending arable and paſture land in my neighbourhood, is drawn up not merely from fancy, but from the exact accounts I have kept of my own crops, and the information I have gained from ſeveral ſenſible farmers.

"I take twenty acres, and ſuppoſe them an addition to a farm; but I ſhould premiſe ſuch an one as will require ſome additional cattle to be kept for it, perhaps two horſes; but a farm of fifty pounds per annum may be ſo circumſtanced as to require no material ſtanding expences extraordinary for ſuch an addition, in which caſe the ploughings, &c. will not coſt near what I have laid them at; but the faireſt way is the ſuppoſition I have made.—We reckon that nothing is either got or loſt by four ſhillings per acre for a clean earth.

Calculation of the Expences and Profit of farming a ploughed or paſture Field of twenty Acres for nine Years, on a Suppoſition that it is not a Farm by itſelf, but an Addition to another of fifty Pounds per Annum, the Soil wet, and a looſe Woodcock, Brick Earth, on the Surface, for eighteen Inches deep, and under that a very good ſtiff Clay, improved by Land-draining.

First Year, Fallow.

	l.	s.	d.
Rent charges — — — —	15	0	0
Firſt ploughing, a clean earth — —	4	0	0
Second ditto, ribbling it cloſe overwart —	4	0	0
Harrowing it overwart — —	0	5	0
Rolling — — — —	0	3	0
Third ploughing, a roving — —	2	10	0
Fourth ditto, a clean earth — —	4	0	0
	29	18	0

Second Year, Barley.

Rent, &c. — — —	15	0	0
Firſt ploughing, a clean earth — —	4	0	0
Harrowing down the ridges — —	0	5	0
Expences of mucking, at twenty loads per acre, and ſpreading the muck, ſuppoſed to be at the farmer's houſe — —	10	0	0
Second ploughing, the ſowing earth, as it may be done with a double-breaſted plough, to ſhut up the barks; that and the harrowing — — —	4	0	0
Seventeen coomb and two buſhels of ſeed-barley, at eight ſhillings and ſix-pence per coomb — — —	7	8	4
Two buſhels and a half of clover-ſeed, at twenty-five ſhillings per buſhel —	3	2	6
Harrowing and water furrowing —	0	10	0
Weeding — — —	1	0	0
Harveſting, two ſhillings and ſix-pence per acre — — —	2	10	0
Threſhing one hundred and ſixty coombs, at ſix-pence per coomb — —	4	0	0
Carrying out one hundred and ſixty coomb, at eight times, eight pounds; but as back carriage may ſometimes be got, ſay	5	0	0
Expences eight times at market —	1	10	0
	58	6	3

Third Year, Clover.

Rent, &c. — — — —	15	0	0
Cutting twenty acres, and harveſting it	3	0	0
Threſhing thirty-two buſhels of clover-ſeed, at four ſhillings per buſhel —	6	8	0
Expences of carrying the ſeed out, and at market — — —	1	15	0
Weeding the clover — —	0	10	0
	26	13	0

Fourth Year, Wheat.

Rent, &c. — — —	15	0	0
Ploughing, harrowing, and water-furrowing the clover-land, and ſowing the wheat, five ſhillings and ſix-pence per acre	5	1	0
Ten coomb of ſeed — —	8	0	0
Weeding — — —	1	10	0
Harveſting, including all expences, five ſhillings per acre — — —	5	0	0
Threſhing one hundred coomb —	5	0	0
Carrying out ditto, at five goings, back carriage three of them, and at market —	3	0	0
Haulming, at one ſhilling and ſix-pence	1	10	0
	44	10	0

Fifth Year, Fallow.

Rent, &c. — — —	15	0	0
Expences the ſame as the firſt year —	14	18	0
	29	18	0

Sixth Year, Wheat.

	l.	s.	d.
Rent, &c.	15	0	0
Mucking, the materials supposed to be in the farmer's yard	10	0	0
Ten coomb of seed blew-chaff wheat	7	0	0
Sowing earth	4	0	0
Weeding	2	0	0
Harvesting	5	0	0
Threshing one hundred and twenty coomb, at one shilling and two-pence per coomb	7	0	0
Carrying out ditto, at six times, as before	5	0	0
	45	0	0

Seventh Year, White Oats.

Rent, &c.	15	0	0
First ploughing, a clean earth	4	0	0
Water-furrowing	0	5	0
Second ploughing, a clean earth	4	0	0
Water-furrowing	0	3	0
Third ploughing, sowing earth, and harrowing	5	0	0
Twenty coomb of seed	8	0	0
Weeding	0	10	0
Harvesting, two shillings and six-pence per acre	2	10	0
Threshing one hundred and twenty coomb	3	0	0
Carrying out six times, and marketing	3	18	0
	46	6	0

Eighth Year, Tares and Turnips.

Rent, &c.	15	0	0
One clean earth, and harrowing ten acres for tares, and water-furrowing, and rolling	2	10	0
Five coomb of seed-tares	2	10	0
Cutting, making, loading, and stacking of fifteen loads of tare fodder	2	0	0
Ploughing up the tare land, a clean earth	2	0	0
Overwarting another clean earth	2	0	0
Roving it	1	5	0
First ploughing for turnips, ten acres, a clean earth	2	0	0
Second ploughing, drawing the ridges into barks	1	0	0
Third ploughing, ribbling it overwart	1	10	0
Harrowing it flat	0	2	6
Fourth ploughing, a clean earth; draw it on to the steach	2	0	0
Fifth ploughing, sowing earth, up-set it, and harrowing	2	5	0
Turnip seed	0	5	0
First hoeing, at four shillings per acre	2	0	0
Second ditto, at two shillings and six-pence	1	5	0
	39	12	6

Ninth Year, Wheat and Barley.

Rent, &c.	15	0	0
Ploughing and sowing the tare land with wheat, water-furrowing, &c.	2	10	0
Five coomb of seed red-stalked wheat	4	0	0
Weeding	0	15	0
Harvesting	2	10	0
	24	15	0

	l.	s.	d.
Brought over	24	15	0
Haulming	0	15	0
Threshing sixty coomb	3	0	0
Carrying out ditto, &c.	2	10	0
Ploughing and sowing the turnip land with barley, harrowing, rolling, and water-furrowing.	2	10	0
Eight coomb of seed patney barley	3	4	0
Weeding	0	2	6
Harvesting	1	5	0
Threshing seventy coomb	1	15	0
Carrying out seventy coomb	1	10	0
	41	6	6

PRODUCE.

First Year.

Sheep-feed worth	1	10	0

Second Year.

One hundred and sixty coomb of barley, at eight shillings per coomb	64	0	0
Shack for cattle	2	0	0
	66	0	0

Third Year.

Feed of clover before it is seeded	20	0	0
Thirty-two bushels of clover-seed, at one pound five shillings per bushel	40	0	0
Feed after seed	2	0	0
	62	0	0

Fourth Year.

One hundred coomb of wheat, at fifteen shillings per coomb	75	0	0
Shack for cattle	1	10	0
	76	10	0

Fifth Year.

Sheep-feed	1	10	0

Sixth Year.

One hundred and twenty coomb of wheat, at fourteen shillings per coomb	84	0	0
Shack for cattle	1	10	0
	85	10	0

Seventh Year.

One hundred and twenty coomb of white oats, at eight shillings per coomb	48	0	0
Shack for cattle	2	0	0
	50	0	0

Eighth Year.

Fifteen loads of tares	15	0	0
Ten acres of turnips to buy cattle in, and fatten on them, to sell off in the spring, worth three pounds per acre	30	0	0
	45	0	0

Ninth Year.

Sixty coomb of wheat, at fourteen shillings and six-pence per acre	87	0	0
Shack	0	15	0
Seventy coomb of barley, at seven shillings and six-pence per coomb	26	5	0
Shack	1	0	0
	115	0	0

First Year.

	l.	s.	d.
Expences -	29	18	0
Produce - -	1	10	0
Loſs - - -	28	8	0

Second Year.

Produce -	66	0	0
Expences -	58	6	3
Profit - -	7	13	9

Third Year.

Produce -	62	0	0
Expences -	26	13	0
Profit - -	35	7	0

Fourth Year.

Produce -	76	10	0
Expences -	44	10	0
Profit - -	32	0	0

Fifth Year.

Expences -	29	18	
Produce -	1	10	0
Loſs - -	28	8	0

Profit.

	l.	s.	d.
2d Year - -	7	13	9
3d Year -	35	7	0
4th Year -	32	0	0
6th Year -	40	10	0
7th Year -	3	14	0
8th Year -	5	7	6
9th Year -	73	13	6
Profit of 7 years	198	5	9
	56	16	0
	141	9	9

Total profit in nine years.

Which is fifteen pounds fourteen ſhillings and eight-pence per annum, or rather better than fifteen ſhillings per acre.

But I ſhould obſerve, that as a crop of clover-ſeed is the moſt uncertain and various of any that is grown, I have reckoned leſs for it by far than multitudes produce, though, at the ſame time, many bring nothing at all.

I know a field of twenty acres, which I have been often told by ſeveral who knew the crop, once produced the farmer five buſhels per acre. It was all down on a Friday, and the farmer ſuſpecting a change of weather, by great rewards to his workmen, and bringing caſks of ale into the field, and feeding them well, tempted them to work in an extraordinary manner all the Saturday, and cleared the whole into barn. It began raining in the night, and ſo much ſucceeding bad weather came, that the crops were, in general, greatly damaged. His produced, as I ſaid, one hundred buſhels, all which he ſold at three pounds ten ſhillings per buſhel, ariſing to three hundred and fifty pounds. And a few years ago I ſaw the ſame field with a crop of clover, which did not produce twenty pecks, and that ſo wretched as to fetch nothing.

Sixth Year.

	l.	s.	d.
Produce -	85	10	0
Expences -	45	0	0
Profit - -	40	10	0

Seventh Year.

Produce -	50	0	0
Expences -	46	6	0
Profit - -	3	14	0

Eighth Year.

Produce -	45	0	0
Expences -	39	12	6
Profit - -	5	7	6

Ninth Year.

Produce -	115	0	0
Expences -	41	6	6
Profit - -	73	13	6

Loſs.

	l.	s.	d.
1ſt Year -	28	8	0
5th Year -	28	8	0
Loſs of 2 years	56	16	0

I read this calculation to a farmer, and he obſerved, that I ſhould reckon eighty buſhels for the crop; and as it is often grown, I will give you another total, with that alteration, that your readers may adopt either, according to their idea of the chance.

	l.	s.	d.
Profit — —	248	13	9
Loſs — —	56	16	0
	191	17	9

which is twenty-one pounds ſix ſhillings and five-pence per annum, or better than a guinea per acre.

As I mention back-carriage in this calculation, I will explain my meaning. We generally carry our corn to Ipſwich, Manningtree, or Thetford, from which places we load home with coals for blackſmiths, or any perſons that want them, who pay us eighteen ſhillings for the carriage, of a loading, twelve ſhillings per chaldron, and we generally bring one and a half. But as we may accidentally carry our corn where none is to be had, I make ſuch allowance as to bring it near the truth.

Calculation of nine Years Expences and Profit of twenty Acres of Graſs-Land, the Soil ſuppoſed to be the ſame as the above Arable-Land, with no other difference than being Graſs or Ploughed.

First Year's Expences.

	l.	s.	d.
Rent, &c — —	15	0	0
Mowing, making and cocking ten acres of graſs to hay at three ſhillings per acre with beer — —	1	10	0
Stacking, loading, &c. of ten loads of hay	1	10	0
Expences on four goings of hay when it is ſold, weighing, and market —	0	16	0
N. B. Nothing is reckoned for carriage, as manure is brought back			
Fifteen old crones, bought in Auguſt	3	15	0
Expences in buying ſheep —	0	4	0
Three cows at five pounds each —	15	0	0
A ſow, and ten pigs three weeks old	2	12	6
Suppoſing two acres to be manured each year with twenty-ſix loads per acre			
Forty loads of clay, at two-pence halfpenny per load — —	0	8	4
Twelve ditto of aſhes, mortar, or rotten dung, brought from Bury; ſix waggon loads, at eleven ſhillings and ſix-pence per load — — —	3	9	0
Expences of carrying it on, and ſpreading, &c.	1	8	0
Turning and mixing manure	0	4	0
	45	16	10

Second Year

Rent, &c. — — —	15	0	0
Mowing, making, &c. of ſix acres of graſs	0	18	0
Stacking, &c. ſix loads of hay —	0	18	0
Weighing, marketing, &c. —	0	10	0
Expences of buying ſheep — —	0	1	6
A ſcore of old crones — —	6	0	0
Manuring two acres as above — —	5	9	4
	28	16	10

Third Year.

	l.	s.	d.
Rent, &c.	15	0	0
Mowing and making &c. eight acres of grafs, at three fhillings per acre	1	4	0
Stacking, &c.	1	4	0
Weighing and marketing, &c.	0	12	0
Expences on cattle,	0	2	0
Fifteen crones	3	15	0
Manuring two acres as above	5	9	4
	27	6	4

Fourth Year.

Rent, &c.	15	0	0
Mowing and making twelve acres at three fhillings per acre	1	16	0
Stacking, &c.	1	16	0
Weighing and marketing	0	18	0
Expences on cattle	0	5	0
Fifteen crones	4	0	0
Manuring two acres as above	5	9	4
	29	4	4

Fifth Year.

Rent, &c.	15	0	0
Mowing and making ten acres	1	10	0
Stacking, &c.	1	10	0
Weighing and marketing,	0	16	0
Expences on cattle	0	3	6
Fifteen crones	3	7	0
Manuring two acres as above	5	9	4
	27	15	10

Sixth Year.

Rent, &c.	15	0	0
Mowing and making nine acres	1	7	0
Stacking, &c.	1	7	0
Weighing, &c.	0	14	0
Expences on cattle	0	4	0
Fifteen crones	4	5	0
Manuring two acres as above	5	9	4
	28	6	4

Seventh Year.

Rent, &c.	15	0	0
Mowing and making twelve acres	1	16	0
Stacking, &c.	1	16	0
Weighing, &c.	0	18	0
Twenty crones	5	0	0
Expences on cattle	0	5	0
Manuring as above	5	9	4
	30	4	4

Eighth Year.

Rent, &c.	15	0	0
Mowing and making eight acres	1	4	0
Stacking, &c.	1	4	0
Weighing, &c.	0	10	0
Twenty crones	5	10	0
Expences	0	7	0
Manuring two acres as above	5	9	4
	29	4	4

Ninth Year.

	l.	s.	d.
Rent, &c.	15	0	0
Mowing and making ten acres	1	10	0
Stacking, &c.	1	10	0
Weighing, &c.	0	8	0
Twenty crones	3	15	0
Expences on cattle	0	10	0
	22	13	0

PRODUCE.

First Year.

Ten loads of hay, wafted to eight, and fold in the winter at two pounds per load	16	0	0
Fifteen old crones fold fat, with their lambs at fifteen fhillings per couple —	11	5	0
As no expences are calculated for the dairy, fuch as wood, utenfils, &c. I fhall lay the clear profit of three cows at four pounds each, which is what I have generally made of mine, every thing paid, and yet kept a calf now and then for ftock; one I reckon this year	12	0	0
I fhall not explain all the methods of managing the hogs, but lay the clear profit of a fow at different fums, fuch as I have generally found my own produce	6	0	0
	45	5	0

Second Year.

Eight loads of hay wafted to feven, and fold at two pounds per load	14	0	0
Twenty crones, fold fat at feventeen fhillings per couple	17	0	0
Three cows at four pounds each —	12	0	0
One fow	6	5	0
	49	5	0

Third Year.

Ten loads of hay, wafted to eight, fold at two pounds per load	16	0	0
Fifteen crones, fold at fifteen fhillings per couple	11	5	0
Four cows, the new one at three pounds (the calf is now a cow)	15	0	0
One fow	6	10	0
	48	15	0

Fourth Year.

Fourteen loads of hay wafted to twelve	24	0	0
Fifteen crones, fold per couple at fifteen fhillings	11	5	0
Four cows, the new one three pounds five fhillings	15	5	0
One fow	7	0	0
	57	10	0

Fifth Year.

Twelve loads of hay wafted to ten	20	0	0
Fifteen crones, fold per couple at fixteen fhillings	12	0	0
Four cows, the new one at three pounds ten fhillings	15	10	0
One fow	5	0	0
	52	10	0

Sixth Year.

Ten loads of hay wasted to eight	16	0	0
Fifteen crones, sold per couple at 16 shillings	12	0	0
Four cows	16	0	0
One sow	7	10	0
	51	10	0

Seventh Year.

Fourteen load of hay wasted to twelve	24	0	0
Twenty crones, sold per couple at seventeen shillings	17	0	0
Four cows	16	0	0
One sow	5	0	0
	57	0	0

Eighth Year.

Twelve loads of hay wasted to ten	20	0	0
Twenty crones, sold per couple at sixteen shillings	16	0	0
Four cows	16	0	0
One sow	5	15	0
	57	15	0

Ninth Year.

Twelve loads of hay wasted to ten	20	0	0
Twenty crones, sold per couple at fourteen shillings	14	0	0
Four cows	16	0	0
One sow	7	0	0
	57	0	0

Expences.				Produce.			
1st Year -	45	16	10	1st Year -	45	5	0
2d Year -	28	16	10	2d Year -	49	5	0
3d Year -	27	6	4	3d Year -	48	15	0
4th Year -	29	4	4	4th Year -	57	10	0
5th Year -	27	15	10	5th Year -	52	10	0
6th Year -	28	6	4	6th Year -	51	10	0
7th Year -	30	4	4	7th Year -	62	0	0
8th Year -	29	4	4	8th Year -	57	15	0
9th Year -	22	13	0	9th Year -	57	0	0
	269	8	2		481	10	0
					269	8	2
					212	1	10

Which is twenty-three pounds eleven shillings and two-pence per annum, or one pound three shillings per acre profit.

The above account displays the vastly superior advantages of grass, with us, to arable land.

You will certainly remark, that nothing in the above account is reckoned for losses of stock; but in answer to that I should observe, that nothing is calculated in the arable account for some bad years, when in such land not a quarter of a crop is produced: and I do not mean this calculation as perfect (that is impossible) but only to discover the proportion between the one method and the other; and from what I have observed, and gathered from the information which the most intelligent farmers can give me, I am clear of opinion, that the chances, on the whole are much in favour of the grass-land, the crop of hay and seed being much more regular than those of corn, clover, or turnips; and supposing the eighty bushels of clover-seed, yet the grass profit far exceeds the arable, even then; but, as I observed, the probobility lies against the latter, supposing the profit to be only fifteen pounds fourteen shillings and eight-pence per annum.

I may remind you, that I supposed this twenty acres to be an addition to a farm, not one by itself, and so compared the respective profits; therefore I have not allowed any thing for the feed which the above-mentioned cattle may accidentally have on the arable land, or turnips which they may expend in the winter; and for this reason, because, although it appears to me that grass is the most profitable husbandry, yet a certain quantity of ploughed land should undoubtedly be a part of every grass-farm, for the raising turnips, some artificial grass, and clover enough for the winter's food.

I hope your readers will peruse this calculation with candour, and believe me, when I assure them it is the nearest truth of any I can make, either from my own experience, or best information. *Museum Rusticum, vol.* III. *page* 317.

State of the Expence of a hoed Crop of Wheat, and the Profit of it, compared with that of the common Husbandry.

I propose here to state the expence of a hoed wheat-crop. If this is done in any place where the price of labour is known, it will be easy from thence to calculate the expence of such crops in any other places.

When wheat is to be horse-hoed, it is planted upon three-bout ridges, about four feet and eight or nine inches broad. If the soil is poor, they may be made broader, but should not be much narrower, otherwise there will not be room enough to plough the intervals. Two rows of wheat, about ten inches asunder, are drilled upon the top of each ridge, and then the intervals or spaces between the double rows will be about three feet and ten inches wide.

For the first crop the land should be well prepared, and very clean: it will therefore cost more than the following crops; and if the land is not in good heart, the first crops will be the smallest, for hoeing greatly improves it. The following estimate is of the succeeding crops.

The necessary culture for these is, once ploughing in autumn, to form the new ridges for the next crop. This may be done with three horses; for the intervals, by frequent hoeing, are kept in fine tilth, and are ploughed at one bout; and in the middle of the ridges where the last crop stood, being only the breadth of two narrow furrows, are easily ploughed at another bout: so that these ridges, which in common ploughing required three bouts with four horses, are now ploughed at two with three horses.

The intervals, after the corn is planted, are hoe-ploughed at one bout, to or from the rows. They are usually thus ploughed four times, once in the beginning of winter, and three times afterwards in the spring and summer.

The ten inch partitions, or spaces, between the rows of wheat, are hand-hoed about the end of March: once is generally sufficient, because the wheat soon afterwards spreads, covers the partitions, and keeps down the weeds. The rows are also to be weeded. This is all the ploughing and hoeing that is commonly necessary till harvest. But as in some years it may be proper to plough the ridges in autumn at five or six furrows, or plough them twice,

sometimes

ſometimes to hoe-plough the intervals more than four times, or to give them a trench-ploughing, where the ſtaple is deep enough to admit of it, I ſhall make a full allowance for theſe, and charge two ploughings and ſix horſe-hoings every year.

The hiring price in ſome parts of Middleſex for ploughing a ſtrong loam the firſt time, in the common way, is ſeven or eight ſhillings an acre; I ſhall ſay eight ſhillings. They work about eight hours, and plough about an acre a day with four horſes. The price of the labour may be thus diſtinguiſhed: to the ploughman twenty-pence, and boy eight-pence a day, including their beer; and then the horſes and harneſs, &c. will come to ſeventeen-pence a day each. Twice ploughing therefore in autumn, with three horſes, comes to eight ſhillings and nine-pence.

The tops of the ridges are to be rolled with a light roller, or harrowed once or twice with two very light harrows, to break the clods, and lay the tops of the ridges ſmooth for drilling. The harrows are faſtened together by a pole; and a horſe, walking in the furrow, draws the two harrows, one upon each ridge. A rolling in the ſame manner is alſo uſeful in the ſpring, when the earth is pretty dry, and before the partitions are hand-hoed. Theſe rollings and harrowings, of two ridges at once by one horſe, are done at a ſmall expence; and not being neceſſary every year, may coſt about four-pence: but to make the total an even ſum, I ſhall charge for them (and uncovering the plants, if any clods happen to fall upon them at the firſt hoe ploughing) ſeven-pence half-penny per acre.

The uſual quantity of ſeed is three pecks, and if it coſts five ſhillings and ſix-pence per buſhel, is four ſhillings and three half-pence per acre. The drilling is performed by a man and boy, and one horſe. They may drill ſix acres a day: I ſhall ſay but five, which is nine-pence per acre.

The intervals ſhould be kept in fine tilth: they are hoe-ploughed at one bout: three horſes are ſufficient for the firſt two hoeings, and two for the reſt. I ſhall reckon three for each hoeing, and then ſix hoeings come to thirteen ſhillings and two-pence.

The price for hand-hoing of beans the firſt time is five ſhillings per acre; I ſhall call it ſix; and as the ten inch partitions, and about two inches on each outſide of the rows, is the whole to be hand-hoed (for the hoe-plough does the reſt) theſe are about one fourth part of the ridge, and ſhould be done for eighteen-pence an acre: but it is a good way to agree with the hoers to cleanſe the rows alſo of weeds, and as theſe ought to be well done, they expect ſomething more than for common work, and they will coſt near half a crown per acre.

For reaping the prices are various; from five or ſix, to ten ſhillings per acre; at a medium, eight ſhillings is a high price. The drilled wheat, having ſcarcely any weeds in it, and ſtanding upon only about a fourth part of the ridge, is eaſier and much quicker reaped than ſown wheat, and not really worth above half the common price; but, for the above reaſon, I ſhall allow, for reaping and carrying ſix ſhilling per acre.

Wheat-ſtraw is a valuable article in the neighbourhood of London; and the ſtraw, chaff, &c. might be reckoned here to pay for threſhing and carrying the corn to market: where it is otherwiſe, an allowance is to be made. And as the diſtance from the market is uncertain, I ſhall charge the carrying out, and at market, a ſhilling per quarter, beſides the value of the ſtraw.

Some eſtates are tithe-free; others pay in kind, or a modus. I ſhall reckon the tythe at four ſhillings per acre.

Suppoſe the rent is ſixteen ſhillings per acre, there remain to be added the taxes, or rates payable by the tenant, which, at two ſhillings in the pound-rent, come to nineteen pence per acre.

I reckon nothing for dung or manure; for land that is proper for wheat, allowing ſufficient intervals and hoeing, requires none. If the wheat of the firſt crops is weak in the ſpring, a top-dreſſing of the rows will be of ſervice, or afterwards, if the proper hoeings have not been given the preceding year; but this ſeldom happens; for hoeing makes the plants ſtrong, and then alſo top-dreſſed, they would be in danger of lodging.

The whole expence, at theſe prices, of horſe-hoed wheat, is, per acre, as follows:

	l.	s.	d.
Two ploughings in autumn, with three horſes	0	8	9
Harrowing, ſeed, and drilling — —	0	5	6
Six hoe-ploughings of the intervals, with three horſes — — —	0	13	2
Hand-hoeing, weeding and harveſting	0	8	6
Carrying out twenty buſhels, and at market, (beſides the value of the ſtraw and chaff) at one ſhilling per quarter —	0	2	6
Tythe, rent, and taxes — —	1	1	7
	3	0	0

This is the whole expence, ſuppoſing the ſoil to be a ſtrong loam, the wages high, and the horſes hired; but when done by the farmers own horſes, or the ſoil lighter, and they work more hours in a day, the expence will be a great deal leſs, as we ſhall ſee below: in ſome places it will not much exceed half this ſum.

It has been already ſhewn, that one hundred acres of horſe-hoed wheat, much of it a light, poor ſoil, produced near twenty buſhels per acre; and that a ſtrong ſoil, by a medium of twenty hoed crops, produced about twenty-four buſhels per acre, both nine gallon meaſure; and therefore we might reckon here a middling crop about twenty-four buſhels: but to avoid all ſuſpicion of partiality, I ſhall ſuppoſe, that a good loam may, one year with another, produce only the leaſt of theſe, or twenty buſhels per acre.

The mean price of wheat at Windſor market, for the laſt twenty years ending at Michaelmas, 1762, is nearly four ſhillings and eight-pence three-farthings per buſhel, and twenty buſhels, at this rate, come to four pounds fourteen ſhillings and ſeven pence; ſo the profit of the horſe-hoed wheat is one pound fourteen ſhillings and ſeven-pence per acre, or above two rents.

Your ingenious correſpondent has above ſtated the produce and expence of twenty acres of arable land for nine years, according to the courſe of huſbandry practiſed in his neighbourhood, I ſhall, by way of compariſon, calculate the profit of theſe twenty acres, ſuppoſing they had been under crops of hoed wheat during theſe nine years:

I reckon, from your correſpondent's account, the wages

wages of his ploughmen to be about fourteen pence, and a boy four-pence a day (if not allowed beer) and the horſes a ſhilling a day each; in all, five ſhillings and ſix-pence, beſides repairs: and if they work more than eight hours, his land being lighter than the above, they may plough about an acre and a half a day, which brings the price for ploughing to near his reckoning of four ſhillings per acre. If this is not exact he will rectify it. I ſhall ſtate the ploughings and horſe-hoings in this proportion, and allow three horſes, though fewer will do in this land. The rent-charges, I ſuppoſe, include the tenant's taxes; if not, they are to be added to the expence. As the tythe is not mentioned in his account, I do not charge it here. The other items are computed in proportion to his, and the above ſtate of the expence; and as I abated four buſhels in the above crop per acre, I ſhall do the ſame here, and reckon a middling crop of hoed wheat at only eighteen buſhels; his producing, by a medium of three crops, twenty two buſhels and two fifths per acre. The expence of a horſe-hoed acre of this land will be nearly as follows.

	l.	s.	d.
Twice ploughing in autumn, with three horſes, and harrowing — —	0	3	$0\frac{1}{2}$
Seed three pecks (fifteen ſhillings and four-pence per coomb at a medium) and drilling five acres a day — — —	0	3	$4\frac{1}{2}$
Six hoe-ploughings with three horſes	0	4	0
Hand-hoeing (at four ſhillings per acre, reckoned for turnips in the account) and weeding — —	0	1	8
Harveſting, three ſhillings and nine-pence: threſhing four coomb and a half, four ſhillings and ten-pence —	0	8	7
Carrying out four coomb and a half, and at market — —	0	4	$1\frac{1}{2}$
Rent-charges — —	0	15	0
Total expence per acre	1	19	$9\frac{1}{2}$
The three crops of wheat were ſold, at a medium, for fourteen ſhillings and five-pence and four ſevenths per coomb, which, for eighteen buſhels, comes to	3	5	$0\frac{1}{2}$
Profit per acre	1	5	3

		l.	s.	d.
The twenty acres, in nine years, produced ſeven crops, valued at five hundred and three pounds; but in the ninth year, the crop of ſixty coomb is caſt by miſtake at eighty-ſeven pounds, which ſhould be but half that ſum; deducting therefore forty-three pounds ten ſhillings, the produce amounts to				459 10 0
The expence of theſe twenty acres in nine years, as charged —	361 10 3			
To which is to be added for four hundred loads of dung	20 0 0			
		381	10	3
Remains the profit in nine years		77	19	9
Which is, per acre per annum, near		0	8	8

There were eight hundred loads of dung laid upon theſe twenty acres; but it is hardly to be ſuppoſed, that half that quantity could be made from the ſeven crops; ſo that at leaſt four hundred loads muſt be had elſewhere; and the dung is at a high price in that neighbourhood.—I have charged but a ſhilling a load for it.

But if it ſhould be ſuppoſed, that more than four hundred loads could be made from theſe ſeven crops, it muſt alſo be admitted, that a quantity in proportion would be made from the nine crops of wheat, which not being neceſſary in the hoeing culture, is worth, to be ſold, more per load than I have reckoned above; and the value of it ſhould then be added to the profit of the hoed crops.

Let us next compare the whole profit of theſe twenty acres in nine years, in both theſe methods of huſbandry.

	l.	s.	d.
The profit, in nine years, of the hoed crops, amounts to — — —	227	5	0
The profit in that time by the common huſbandry — — —	77	19	9
Balance in favour of the New Huſbandry	149	5	3

Hence appears the great ſuperiority of the hoeing culture; and even allowing the clover had produced four buſhels of ſeed per acre, the New Huſbandry is ſtill by far the moſt profitable.

J.

J A U — I N C

JACK, an inſtrument for turning the ſpit; alſo a contrivance for ſupplying the place of a boy in pulling boots off. It alſo ſignifies a ſupport for ſawing wood upon.

JAMOCK, or *jannock*, oaten bread made into large loaves.

JARDON, a name given by farriers to a ſwelling on the out-ſide of the back of a horſe.

It generally proceeds from blows and kicks of other horſes; but frequently happens to managed horſes, by ſetting them on their haunches: it is ſeldom attended with much lameneſs, unleſs it has been neglected, or ſome little proceſs of the bone broken. It ſhould be firſt treated with coolers and repellents, ſuch as hot vinegar, verjuice, &c. but if any ſwelling continues hard and inſenſible, the beſt way is to bliſter or fire; but mild bliſters alone generally ſucceed. *Bartlet's Farriery, page* 263.

JAUNDICE, a diſtemper incident to horſes, and generally called, by farriers, the yellows.

Horſes are frequently ſubject to this diſtemper, which is known by a duſky yellowneſs of the eyes; the inſide of the mouth and lips, the tongue and bars of the roof of the mouth looking alſo yellow. The creature is dull, and refuſes all manner of food; the fever is ſlow, yet both that and the yellowneſs increaſe together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour; and, when it has ſettled ſome time on the pavement, it looks red like blood. He ſtales with ſome pain and difficulty, and if the diſtemper is not checked, ſoon grows delirious and frantic. The off-ſide of the belly is ſometimes hard and diſtended; and in old horſes, when the liver has been long diſeaſed, the cure is ſcarce practicable, and ends fatally with a waſting diarrhœa: but when the diſtemper is recent, and in young horſes, there is no fear of a recovery, if the following directions are obſerved.

First of all bleed plentifully; and give the laxative clyſter, as horſes are apt to be very coſtive in this diſtemper; and the next day give him this purge.

Take of Indian rhubarb, powdered, one ounce and a half; ſaffron two drams, ſuccotrine aloes ſix drams, ſyrup of buckthorn a ſufficient quantity.

If the rhubarb ſhould be found too expenſive, omit it, and add the ſame quantity of cream of tartar, and half an ounce of Caſtile ſoap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

Take of Æthiops mineral half an ounce; millepedes the ſame quantity, Caſtile ſoap one ounce; make into a ball, and give one every day, and waſh it down with a pint of this decoction.

Take madder root and turmerick, of each four ounces; burdock root ſliced, half a pound; Monk's rhubarb four ounces; liquorice ſliced two ounces: boil in a gallon of forge water to three quarts; ſtrain off, and ſweeten with honey.

Balls of Caſtile ſoap and turmerick may be given alſo for this purpoſe, to the quantity of three or four ounces a day, and will in moſt recent caſes ſucceed.

By theſe means the diſtemper generally abates in a week, which may be diſcovered by an alteration in the horſe's eyes and mouth; but the medicines muſt be continued till the yellowneſs is entirely removed. Should the diſtemper prove obſtinate, and not ſubmit to this treatment, you muſt try more potent remedies, viz. mercurial phyſic, repeated two or three times at proper intervals; and then the following balls:

Take ſalt of tartar two ounces, cinnabar of antimony four ounces, live millipedes and filings of ſteel, of each four ounces, Caſtile or Venice ſoap half a pound: make into balls of the ſize of pullets eggs, and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give him two or three mild purges, and, if a full fat horſe, to put in a rowel. *Bartlet's Farriery, page* 156.

ILES, or *oiles*, the beards or the ears of barley, wheat, &c.

INCLOSURE, the ſeparation of common grounds into diſtinct poſſeſſions.

The incloſing lands, and dividing them into different fields, paſtures, &c. is a moſt eſſential part of their real improvement, and attended with many very conſiderable advantages, of which we ſhall here mention only the following:

Incloſures aſcertain to every man his juſt and due property, and thereby prevent infinity of treſpaſſes, injuries, and other ſources of ruinous litigation. They keep the land warm, and add to its fertility, by ſcreening it from violent and nipping winds, which otherwiſe frequently deſtroy whole crops; and they alſo defend it from thoſe drying and ſcorching winds, which ſo often blaſt at once the huſbandman's, till then well grounded, expectations. They afford ſhade in the ſummer, and ſhelter in the winter, for cattle, which would otherwiſe deſtroy more

more with their feet than they eat with their mouths, and which, for want of theſe might, as Mr. Worlidge obſerves, loſe more of their fat or fleſh in one ſultry day, than they gain in three cold ones. Their cuttings afford fuel to the induſtrious huſbandman, and, if carefully planted and preſerved, they will here and there furniſh him with timber for his carts, ploughs, and other utenſils, beſides ſometimes uſeful fruits. They are an excellent encouragement to good huſbandry, and a great remedy againſt beggary, by employing many poor people in the labour which either the making, or the mending of them conſtantly requires, and which is amply repaid by the increaſe of crops: for it hath been remarked, not only that well incloſed countries generally maintain treble the number of inhabitants, or more, than the champaign; but alſo, that thoſe inhabitants are much better fed and clad, than the common run of people in unincloſed lands. To be convinced of this, let any one but examine our vaſt downs, commons, heaths, waſtes, and unimproved foreſts, badges yet remaining, as Mr. Worlidge properly terms them, of poverty and idleneſs; but at the ſame time, thoroughly ſuſceptible of being converted, with proper care, into corn and paſture fields, meadows, gardens, orchards, and pleaſant groves, the marks of induſtry and good huſbandry. Let him but compare the naked parts of Wiltſhire, Glouceſterſhire, Hampſhire, Surry, &c. with the delightful parts of Kent, Herefordſhire, and other counties, and he cannot but be ſtruck with a demonſtration of the immenſely valuable improvements which may yet be made in very many parts of this kingdom. The now unimproved, un-occupied crown-lands, might alone, or even only a part of them, be rendered an inexhauſtible ſource of unequalled wealth to the ſovereign, of a vaſt increaſe of his ſubjects, and of happineſs to all.

The common objection againſt incloſures have been ſo well refuted by many very able writers, and are daily invalidated by that moſt unerring teſt, experience, that it would be needleſs for us to recapitulate them here: we therefore ſhall only point out one farther eſſential advantage attending this great improvement, which is, that it enables the farmer to act as is moſt agreeable to him in ſowing when, and what, he pleaſes.

Every gentleman, whoſe eſtate is not yet incloſed, and who is conſequently at liberty to chooſe the manner and means of doing it, will rationally begin with having a map of it drawn, that he may thereby be enabled to divide and portion it out, with the greater propriety and preciſion, ſo as to render it moſt pleaſing to the eye, and moſt convenient to each farmer. If he has a place of reſidence upon it, he may make the whole become ornamental to that reſidence, by a judicious diſpoſition of his hedges and plantations, as has been nobly done at Boughton, in Northamptonſhire, by the late duke of Montague, who, with a moſt refined taſte, and truly benevolent mind, diſdaining all the little and confined ornaments of a park, executed his fine improvements there in ſuch a manner, as to render them pleaſingly beneficial to all his neighbours, as well as to every perſon ſettled upon his land. Gubbins, in Hertfordſhire, the ſeat of Sir Jeremy Sambrook, is another charming example of elegance, though leſs extenſive than the former.

Ha-ha walls, and pieces of water, with rails running acroſs them, are an eaſy means of preſerving a fenced level.

The farms ſhould be ſo divided, that the dwelling of each tenant may be as contiguous to his land as conveniency will admit of, to prevent length of carriage, and to facilitate his due attendance.

Small farms have always been obſerved to yield the greateſt proportional rent, and ſmall incloſures conſtantly produce the moſt plentiful crops.

Incloſures for arable lands ſhould be larger than for paſtures, that the ſoil may be kept dry, and the corn be well aired. For the manner of making incloſures, *ſee the article* FENCE.

ING, a common paſture or meadow.

INOCULATION, a very curious operation in gardening, otherwiſe called budding.

It is a kind of grafting practiſed in the ſummer months on ſeveral kinds of ſtone fruits, as peaches, nectarines, cherries, plums, apricots, &c. alſo upon oranges, jaſmines, and various other ſorts of plants, which ſucceed better by this practice, than by the common method of grafting. The operation is performed in the following manner:

Being provided with a ſharp knife, with a flat haft, made for this purpoſe, as alſo with the cuttings of the tree intended to be propagated, make choice of a ſmooth part of the ſtock intended to be inoculated; if deſigned to be dwarf, five or ſix inches from the ground: but if a ſtandard, it ſhould be budded at the height of five and a half, or ſix feet; then, with your knife, make an horizontal cut acroſs the rind of the ſtock, and from the middle of that cut make a ſlit downwards about two inches in length, being careful not to cut deeper than the thickneſs of the bark, leſt the ſtock is wounded; then having the cutting ready, cut off the leaf from the bud, leaving the foot-ſtalk remaining; cut the bud off lengthways, ſomewhat longer than the ſlit in the ſtock, with part of the wood to it; this done, with your knife ſlip the wood from the bark with a ſudden jerk, and obſerve whether the eye of the bud is left or not, for thoſe buds which loſe their eyes in ſtripping are uſeleſs: then with the handle of the knife gently raiſe the bark on each ſide of the ſlit in the ſtock, and inſert the bud therein, obſerving to place it ſmooth between the rind and wood of the ſtock, cutting off that part off the rind of the bud which may happen to be too long for the ſlit made in the ſtock; ſo having exactly fitted the bud to the ſtock, tie them cloſely round with wetted ſtrong baſs, taking care not to bind round the eye of the bud, which ſhould be left open. In about three weeks or a month, the buds will require to be looſened of the bandage, which, if not done in time, will be very injurious to them, but not to be entirely diveſted of the binding, as it is not amiſs to ſlightly tie them again, which will prevent the bark of the ſtock from flying open, as ſometimes happens, whereby the bud is much injured, if not entirely deſtroyed.

The March following, the ſtock ſhould be cut off about three inches above the place of inoculation, ſloping it the contrary way to the bud; this length is of uſe to faſten the ſhoot which proceeds from the bud, which otherwiſe might be blown out by ſtrong winds; but the autumn following, it ſhould be cut cloſe juſt above the bud, that the place of amputation may the more readily be barked over.

The time for inoculation, is from the middle of June to the latter end of Auguſt, according to the ſeaſon and the forwardneſs of the different ſorts of trees intended to be budded, which muſt be known by trying if the buds will

ſeparate from the wood eaſily. The firſt ſort of fruit commonly inoculated, is the apricot, and the laſt the orange; although the orange is commonly budded in Auguſt, it is very proper to try the operation in July, and thoſe ſtocks which miſcarry may be budded the ſucceeding month, or even in September; but let it be done when it will, it is proper to place them in a gentle heat, giving them plenty of water, by which means there will be no reaſon to doubt of their ſucceſs.

In performing this operation, it will be neceſſary to take the opportunity of moiſt cloudy weather, as the bud and ſtock will more readily unite, being more replete with juices than in hot dry weather, when the ſtock will perſpire ſo faſt, as to leave the buds deſtitute of moiſture.

INOM, or *Innum barley*, ſuch barley as is ſown the ſecond crop after the ground is fallowed.

INSECT, a general name for the ſmaller kinds of animals.

With regard to the generation of inſects, the world is now in general convinced, that they are not bred from corruption, but from eggs, though the contrary was believed by the ancients.

Malpighi, Swammerdam, and Redi, have abundantly confuted the doctrine of equivocal generation, as well as the chimerical transformation of the caterpillar into the butterfly, and have ſhewn, that all the members of the butterfly were incloſed under the nympha or ſkin of the caterpillar, as the parts of a plant are in the ſeed.

Inſects take particular care to depoſit their eggs or ſemen in ſuch places where they may have a ſufficient incubation, and where the young, when hatched, may have proper food till they can ſhift for themſelves. Thoſe whoſe food is in the water, lay their eggs there; thoſe to whom fleſh is a proper food, in fleſh; and thoſe to whom the fruits or leaves of vegetables are food, are accordingly depoſited there, but conſtantly the ſame kind in the ſame tree. As for others that require a greater degree of warmth, they are provided by the parent with ſome place in or about the body of other animals, as the feathers of birds, hair of beaſts, ſcales of fiſh, in the noſe, in the fleſh, nay ſome in the bowels of man, and other creatures. As for others, they make them neſts, by digging into the earth, wood, &c. carrying in and ſealing up proviſions that ſerve for the production of their young, and for their food when produced.

There is obſerved in flies, butterflies, &c. a kind of glue, by which the female faſtens her eggs to the bearing buds of trees, &c. ſo as not to be hurt by rain or froſt.

Mr. Andry, in his Treatiſe *De la Generation des vers dans le Corps de l'Homme*, takes notice, that the ancients were miſtaken in denying that inſects breathed, on account of their wanting lungs; for modern obſervations convince us, that inſects have a greater number of lungs than any other animals. They alſo thought that they had no blood, as many of them had no red liquor like ours; but it is not the colour, but the uſe of the liquor, that is to be regarded. They alſo believed that they had no hearts; whereas our microſcopes now diſcover that, when inſects have ſeveral lungs, they have alſo ſeveral hearts; and this in particular is obſervable in ſilk-worms, who have a continued chain of hearts from the head almoſt to the extremity of the tail; and, as is apparent from ſeveral inſects, who give ſigns of life, long after they are divided into ſeveral parts.

Inſects want no parts that are either neceſſary or convenient for their uſe or to render them complete in their kind. Some affirm that earth-worms, and thoſe round-tailed worms, which are found in the inteſtines of men, horſes, &c. as alſo ſnails and horſe-leeches, are hermaphrodites; but that ſuch worms as become flies, and that ſilk-worms are not ſo, being of no ſex, but neſts full of real animals, which in time come out with wings.

Several ſorts of inſects do irreparable injury to the huſbandman, tho' ſo very minute as hardly to be diſcovered. Among others, a ſmall kind of worm gets into the roots, chiefly of oats, and, working upwards, deſtroys all the inſide of the plant, which periſhes ſoon after. M. Duhamel ſuſpects it to have been an inſect of this kind that deſtroyed vaſt quantities of wheat in the neighbourhood of Geneva, and of which M. de Chateauvieux ſent him the following account. "Our wheat, ſays that illuſtrious huſbandman, in the month of May 1755, ſuſtained a loſs which even that cultivated according to the New Huſbandry did not eſcape. We found in it many little white worms, which afterwards became of a cheſnut colour. They poſt themſelves between the blades, and eat the ſtems. They are uſually found between the firſt joint and the roots. Every ſtalk which they attacked, grew no more, but became yellow and withered. The ſame misfortune befel us in the year 1732. Theſe inſects appeared about the middle of May, and made ſuch havock that the crop was almoſt deſtroyed."

Mr. Liſle mentions, that on the 13th and 14th of June, in pulling up wheat in ear, and ſow-thiſtles, he obſerved among the upper parts of the root of moſt of theſe plants, knots or cluſters of graſs-lice, or green locuſts, as he calls them, which appeared whitiſh when they were but juſt come to their ſhape, and as yet under ground; and among moſt of theſe cluſters he obſerved a fly at her incubation, very turgid, of a whitiſh matter; ſhe being then blowing theſe inſects. Her wings were black, and he thought her plainly the ſame as the locuſt, excepting that it had wings. He did not find more than one fly at any one root.

We too often find, in our kitchen-gardens, a ſort of vermin called vine-fretters. They fix upon the roots of leguminous plants, which afterwards gradually turn yellow and die. M. Tillet ſays he has obſerved the ſame inſect in the roots of wheat.

The cuckow-ſpit, or ſpring-forth, as it is commonly termed, lodges itſelf principally in the joints of plants, ſeldom appears before the latter end of May, and is moſt common when rain has fallen after a ſeries of dry weather. M. Poupart, in his account of this little creature, ſays, that as ſoon as it is out of its egg, it goes to a plant, which it touches with its fundament, and faſtens there a white drop of liquor full of air; that it drops a ſecond near the firſt, then a third, and ſo on till it covers itſelf all over with a ſcum or froth, which keeps it from the heat of the ſun, or ſpiders that would ſuck it. But Mr. Liſle takes this liquid to be nothing but the nightly dew, which falls on the fork or joint of the plant, where the little inſect works it into froth with its proboſcis, as with a bellows. *See the article* BUTTERFLY.

INSTEP, a name given to that part of a horſe's leg, which reaches from the ham to the paſtern-joint.

INUNDATION, a flood, or the overflowing of lands by a large collection of water. For the manner of guarding againſt the bad effects of inundations, *ſee the article* BANKS.

Jug, a large drinking veſſel, with a gibbous or ſwelling belly.

JUNET, earth-nut.

KEEVE,

K.

KEEVE, a fat in which beer is worked or fermented.

KELL, a web, or kind of bag, in which inſects are bred.

KID, a ſmall faggot of under or bruſh-wood.

KIDEROW, a place for keeping a ſucking calf.

KIDNEYS, two pretty large glandulous bodies ſituated in the cavity of a horſe's loins upon the two lowermoſt ribs.

Their uſe is to ſeparate the urine, which is of great importance to the health and preſervation of horſes, they being liable to many diſeaſes, which either take their origin from faulty kidneys, or have at leaſt ſuch ſymptoms, as plainly ſhew the kidneys to be more or leſs affected.

The ſigns of the kidneys being hurt or affected, are a weakneſs of the back and loins, difficulty of ſtaling, faintneſs, loſs of appetite, and deadneſs in the eyes; the urine is thick, foul, and ſometimes bloody, eſpecially after a violent ſtrain. A horſe diſeaſed in his kidneys can ſeldom back, that is, move ſtrait backwards, without pain, which is viſible as often as he is put to the trial: the ſame thing is obſervable indeed in horſes, whoſe backs have been wrang and wrenched, but with this difference, that in the latter there is ſeldom any defect or alteration in the urine, except that it is higher coloured.

Bleeding is the prime remedy, and that plentifully, in order to prevent inflammation; and the more ſo, if a fever attends a difficulty in ſtaling, for then we may ſuſpect the kidneys already inflamed. A rowel in the belly has been found uſeful, and the following balls may be given twice or thrice a day, with a pint of marſhmallow decoction, in which half an ounce of gum-arabic is diſſolved, with an ounce of honey.

Take Lucatelli's balſam one ounce, ſpermaceti ſix drams, ſal prunellæ half an ounce; mix into a ball with honey: if the urine is bloody, add half an ounce of Japan earth.

Should the fever continue, bleed largely, give emollient clyſters, and the cooling, opening drink, till it abates.

If the urine paſſes with difficulty and pain, notwithſtanding theſe means, give this ball, and repeat it twice or thrice a day, till the horſe ſtales freer and without pain, his urine becomes of a right conſiſtence, and is free from any purulent ſettlement.

Take balſam of capivi, or Straſbourg turpentine, and Venice ſoap, of each one ounce; nitre ſix drams, myrrh powdered two drams; make into a ball with honey, and waſh it down with the marſhmallow decoction.

But if this method ſhould not be ſucceſsful, and the urine continues turbid, grows coffee coloured or fœtid, the horſe loſing his appetite and fleſh, it is a ſure ſign of ulceration in the kidney; which if the above remedies do not ſoon remove, you may depend on it the horſe will go into a conſumption, and is incurable.

As a ſuppreſſion of urine ariſes ſometimes from an inflammation of the kidney; ſo at others, from a paralytic diſorder, diſabling them in their office of ſeparating the urine from the blood: in this latter caſe the bladder is uſually empty, ſo that a horſe will make no motions to ſtale, and if he continues a few days in this condition, his body will ſwell to a great degree, breaking out in blotches all over, and death will ſoon cloſe the ſcene.

If it ariſes from inflammation, bleed largely, and treat the horſe as above recommended; but if not, give ſtimulating clyſters, and ſtrong diuretics, ſuch as the following balls once in four hours; for if a horſe ſtales not in thirty hours, his danger muſt be great.

Take juniper-berries powdered one ounce, ſal prunellæ ſix drams, ætherial oil of turpentine half an ounce, camphor one dram, oil of juniper two drams; make into a ball with honey, and give after it three or four horns of the marſhmallow decoction and honey.

Or,

Take ſquills powdered two or three drams, nitre half an ounce, or ſix drams; make into a ball with honey.

Or,

The following, which is more forcing, and ſhould be given with caution.

Take cantharides well dried, from one ſcruple to half a dram; camphor diſſolved in oil of almonds, from one dram to two; nitre and Venice ſoap, of each an ounce; mix into a ball with ſyrup of marſhmallows.

When this laſt ball is given, the horſe ſhould be made to drink plenty of water, with gum-arabic diſſolved in it; the following clyſter may alſo be given at the ſame time.

Take of Barbadoes aloes two ounces, the ſame quantity of Venice turpentine, beat up with the yolks of

of two eggs; jallop powdered two drams; juniper and bay-berries, each a handful, bruiſed and boiled in two quarts of a decoction of mallows; ſtrain off and mix by degrees with the above, to which add a pint of linſeed-oil.

If the complaint is not recovered by theſe means, rub the horſe's reins well with two part of oil of turpentine, and one of oil of amber; and apply a poultice of garlic, horſe-radiſh, muſtard-ſeed, camphor, and green ſoap, ſpread on thick cloth, over them. Give the horſe alſo two drams of calomel over night, and a moderate purge the next morning. Theſe, perhaps, are the chief and beſt remedies that can be given in this generally fatal diſorder.

When the ſtrangury in a horſe does not ariſe from wind, or dung preſſing on the neck of the bladder, the cauſe is from inflammation, or too long a retention of the urine. Such horſes make frequent motions to ſtale, ſtand wide and ſtraddling, are full, and have their flanks diſtended. In this caſe bleed largely; give the following drink, and repeat it every two hours for two or three times, till the horſe is relieved.

Take Venice turpentine broke with the yolk of an egg one ounce, nitre or ſal prunellæ ſix drams, half a pint of ſweet oil, and a pint of white wine.

If this drink ſhould not have the deſired effect, the diuretic ball above-mentioned may be given in the ſame manner, omitting the myrrh.

Give the horſe plenty of the marſhmallow decoction, in a quart of which diſſolve an ounce of nitre and gum-arabic, and two of honey.

Horſes ſubject to a diabetes, or profuſe ſtaling, if old, or of weak conſtitution, are ſeldom cured; they ſoon looſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes; but he muſt not be indulged with too much water, or moiſt food. Give him the following:

Take jeſuits-bark four ounces, biſtort and tormentil-root, of each two ounces; boil in two gallons of lime-water to the conſumption of half, and give a pint three times a day.

Let the horſe drink two or three quarts a day of lime-water; and if theſe medicines ſhould not ſucceed, give a quart of ſtrong allum poſſet, three or four times a day.

This method is proper alſo for a horſe who ſtales blood; or the following balls may be given for that purpoſe, if the bleeding is profuſe.

Take bole-armoniac one ounce, Japan earth half an ounce, roch allum two drams, elexir of vitriol one dram; make into a ball with conſerve of roſes, and give it every ſix hours.

As this diſorder generally proceeds from too violent exercise, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up. *Bartlet's Farriery, page* 159.

KILN, a kind of ſtove for admitting heat, in order to dry any ſubſtance, as malt, hops, &c. *See the articles* MALT *and* HOPS.

KILN alſo ſignifies a fabric conſtructed for burning lime-ſtone, chalk, &c. into lime.

The kiln commonly uſed for this purpoſe is a large pit, generally round, and of a ſize proportioned to the quantities intended to be burnt. It is wideſt at the top, and narrower, by degrees, as it comes nearer the bottom. The inſide of this pit is ſometimes lined with a wall built of lime-ſtone; but more commonly, and more properly with brick: at the outſide, near the bottom, is a hole, or door, by which the aſhes are taken out; and above that, ſome have an iron-grate, which comes cloſe to the wall round about: but others make an arch with ſtone, or large pieces of chalk; and upon this they lay a layer of ſtone, or of whatever elſe they burn in the kiln; upon this they place a layer of fuel, and ſo on, layer over layer, till the kiln is full; only obſerving that the outermoſt layer be always of the fuel, and not of chalk or ſtone. When the kiln is thus filled, fire is given at the hole underneath; and the lime is finiſhed in a different time, according to the nature of the ſubſtance. That made of chalk is generally burnt in twenty-four hours; but ſtone often requires ſixty hours. Ten buſhels of ſea-coal, or one hundred of faggots three feet long, will burn forty buſhels of chalk, which will yield thirty buſhels of unſlacked lime. Where chalk is ſcarce, the chalk rubbiſh is often worked up into a kind of paſte, with water, and made into a ſort of bricks, which are dried in the air, and then burnt into lime in the common way: but this is not quite ſo good as that which is burnt from the chalk-ſtone.

The experience of late years has ſhewn that it is more profitable to burn lime in kilns ſhaped like a hogſhead; that is, ſmall in circumference at the bottom, gradually wider towards the middle, and then contracting again upwards to the top. This kiln, as Mr. Lummis obſerves in his letter to the Edinburgh Society, publiſhed by Mr. Maxwell, ſhould be made entirely within the ſurface of the ground, on the declivity of a little hill, where that ſituation can be had, ſo as to allow free acceſs to the air-hole or ſurface. At the bottom, about a foot from the ground, are iron-bars, placed horizontally aroſs, to give the kiln a good draught, and upon theſe bars are laid, firſt ſmall wood or furze, then ſmall coals, then ſtones about the bigneſs of an egg, then another layer of fuel, and ſo on, increaſing the ſize of the ſtones towards the middle of the kiln, where they may be as big as half a peck, and decreaſing their ſize gradually up to the top, obſerving to lay the ſmalleſt neareſt to the ſides. The ſtones need not be broken ſo ſmall for this kiln, as for thoſe above ground; they will be burnt more truly without raw ſtones, or running into cinders; and not above half the quantity of fuel conſumed in the common way, will be uſed in this.

The following method of conſtructing another kiln is thus particularly deſcribed in Mr. Maxwell's Collection.

At bottom, the kiln muſt be three feet four inches wide; and at the height of two feet four inches, three feet ſix inches. At the depth of four feet and a half, it muſt be four feet and a half wide. A ſecond ſlope is then made five feet and a half higher, at the end of which, the kiln, then ten feet deep, ſhould be exactly ten feet wide within the walls. A third ſlope ſhould heighten it to 14 feet, where it ſhould be exactly 12 feet and a half wide, likewiſe, within the walls. From thence it is run up to the heigh of nineteen feet, when it ſhould be rather leſs than fifteen feet wide. The ſlopes muſt be made as gradual

dual as poſſible, and the inner ſurface of the kiln muſt be quite ſmooth, that its contents may fall down equally when the burnt ſtones are drawn out below. By extending a line from a pole fixed in the center of the bottom or floor of the kiln to the ſides, workmen will eaſily be guided in making the above-mentioned ſlopes. This kiln has four vents, oppoſite to one another, and no croſs-irons whereupon to lay the coals and ſtones, they being ſupported by old timber, furze, broom, &c. above which the coals are laid: but if the kiln be built on the ſide of a hill, it can have but three vents. The firſt layer of ſtones above the vents ſhould be cloſely jambed in, and reſt againſt the ſides of the wall. A kill of the above dimenſions will burn eighty buſhels of lime-ſtones in a day: but it may be made larger, without altering theſe dimenſions, by only adding two or three feet to the height, which will require ſtrong walls. This addition to the height need not be ſloped, but may be made perpendicular.

The late earl of Stair had a kiln at New Liſton, and others in Galloway, built in the ſhape of an egg, opened a little at both ends, and ſet upon the ſmalleſt. This kiln anſwered exceedingly well, and beſides lime-ſtone, burnt any kind of earth that was thrown into it.

Kilns thus built, ſwelling at or about the middle, and contracting again at the top, reverberate more ſtrongly, and make a more intenſe heat, than thoſe which grow wider and wider, and are not contracted.

When the kiln is filled, or finiſhed as it is commonly termed, it ſhould be covered over with ſods or ſtrong turf, to keep the heat as intenſe as poſſible, and hinder the wind from blowing the fire at the top, or rain from abating or extinguiſhing it. The ſtones muſt be broke in pieces before they are thrown into the kiln; otherwiſe the air contained in their cavities, being expanded by the heat, will often make them fly with ſuch violence as to damage the kiln. For this reaſon they ſhould be broken ſmaller for kilns that are above ground, than for thoſe which are underneath. The ſaving of this labour, and of near half the quantity of fuel, renders theſe laſt greatly preferable.

Lime is made of chalk, or of any ſtone that is not too cold, or ſandy, as free-ſtone and the like. All the ſoft ſtones that are of a tolerably cloſe texture, will burn to good lime, as will alſo marble, ſlate, ſea-ſhells, corals, and flints; but this laſt kind of ſtone is more difficult to be burnt into lime than the others, except in a reverberatory kiln, becauſe it is apt to run to glaſs. The hardeſt, firmeſt, and whiteſt ſtones make the beſt lime; and when it is made of chalk, that which is formed of the hardeſt, ſtoney kind, is much better than that which is made from the ſoft; but the harder the ſtones are, the more fire it requires to burn them. Both ſorts may be burnt with wood, coals, turf, furze, or fern, which make a very fierce fire.

Theſe kilns ſeem to be intended for burning only one kiln full at a time: but where large quantities of lime are wanted, perpetual kilns, that is, kilns where the fire is kept conſtantly burning, are conſtructed on nearly the ſame principles. Here the iron bars at the bottom are abſolutely neceſſary, in order to take out the lime as ſoon as it is burnt. When ſtone-lime, which requires the moſt violent fire, is burnt in theſe kilns, vents are made near the bottom to be opened occaſionally, according as the wind ſits, that a ſtronger current of air may quicken the fire, and thereby give it the more power. *See the article* LIME.

KILN-ASHES, the aſhes made in kilns where wood, ſtraw, furz, &c. are burnt. Theſe aſhes are a good manure for almoſt any kind of ſoil. In the weſt of England, the farmers ſift them over their corn and graſs; but this muſt not be done in windy weather, becauſe they are ſo very light, that they would eaſily be blown away. They ſucceed beſt when laid on juſt before rain or ſnow.

KINNEL, a powdering tub.

KIT, a milking-pail, in the form of a churn, with two ears and a cover.

KNAPWEED, the ſame with blue-bottle. *See* BLUE-BOTTLE.

KNOT-GRASS, the ſame with couch-graſs. *See* COUCH-GRASS.

KNOLL, a little round hill.

KNOLLS, a term uſed in ſome counties of England to ſignify turnips.

L.

LAR LEA

LACTARY, a milk-houſe.

LADIES-SMOCK, *Cuckow-flower*, or *Canterbury-bells*, a perennial weed, and common in paſture grounds. The ſtalk is upright, round, and ſmooth. The leaves are winged, with the lobes of the lower ones roundiſh, and of thoſe on the ſtalk oblong. The flowers are large, handſome, and white, or purpliſh, conſiſting of four obtuſe veined petals. The ſeeds are contained in erect compreſſed pods, about an inch in length, divided into two cells, which, when ripe, burſt with a touch, and throw out their ſeeds to a conſiderable diſtance.

LAIRE. *See* LAYER.

LAMB, the young of the ſheep-kind. *See the article* SHEEP.

LAMENESS, in horſes. *See the article* STRAINS.

LAMPAS, an excreſcence in the roof of a horſe's mouth, which is ſometimes ſo luxuriant, that it grows about the teeth, and hinders his feeding.

The cure conſiſts in lightly cauterizing the fleſh with a hot iron, taking care that it does not penetrate too deep, ſo as to ſcale off the thin bone that lies under the upper bars; the part may then be anointed with burnt allum and honey, which is proper for moſt ſores in the mouth. *Bartlet's Farriery, page* 282.

LAND. *See the article* GROUND *and* SOIL.

LARCH-TREE, a genus of trees, whoſe leaves, which are long and narrow, are produced out of little tubercles, in form of a painter's pencil: the cones are produed at remote diſtances from the male flowers on the ſame tree: the male flowers are very like ſmall cones at their firſt appearance, but afterwards ſtretched out in length.

Theſe trees are propagated by ſeeds, which ſhould be ſown in the beginning of March, upon a bed of light ſoil, expoſed only to the morning ſun: or otherwiſe they may be ſown in pots or boxes of light earth, and placed near a hedge, where they may have the morning ſun only. The ſeed ſhould be covered about half an inch thick with fine light earth, and in very dry weather ſhould be gently refreſhed with water. In about ſix weeks, if your ſeeds were good, your plants will come up, at which time you ſhould carefully guard them againſt the rapacious birds, which would otherwiſe pull off the heads of the plants, as they thruſt themſelves out of the ground with their covers on them: and obſerve to refreſh them with water in dry weather, eſpecially if they are ſown in pots or boxes; alſo to keep them clear from weeds, which, if ſuffered to grow among the young plants, will ſoon deſtroy them: nor ſhould they be too much expoſed to the ſun, or ſtrong winds, both which are very injurious to theſe plants while they are young: but in October you ſhould, if they are in boxes or pots, remove them into a ſituation where they may be defended from ſharp winds, which are ſometimes hurtful to them, while young; but afterwards, they will indure the ſevereſt weather of our climate.

Theſe trees are very proper for the ſides of barren hills, where few other ſorts will thrive ſo well; nor is this tree very delicate in its ſoil, but will grow much better on poor, ſtrong, ſtony land, than in rich ground; and, during the ſummer, they appear very beautiful; but in autum they caſt their leaves, whereby ſome people have been deceived, by ſuppoſing them dead, and have deſtroyed them.

From the wounded bark of this tree exudes the pureſt Venice turpentine; and on the body and branches of it grows the agaric, which is a drug uſed in medicine.

LATH, a long, thin, and narrow ſlip of wood, nailed to the rafters of a roof or cieling, in order to ſuſtain the covering.

Theſe are diſtinguiſhed into three kinds, according to the different kinds of wood of which they are made, viz. heart of oak, ſap laths, and deal laths; of which the two laſt are uſed for cielings and partitions, and the firſt for tiling only.

Laths are alſo diſtinguiſhed according to their length, into five feet, four feet, and three feet laths; though the ſtatute allows but of two lengths, thoſe of five, and thoſe of three feet, each of which ought to be an inch and a half in breadth, and half an inch in thickneſs; but they are commonly leſs.

LATH-BRICKS, bricks much longer than ordinary, uſed inſtead of laths, for drying malt; for which purpoſe they are extremely proper, as not being liable to catch fire, and retaining the heat much longer than thoſe of wood; ſo that a very ſmall fire will ſerve after they are once heated.

LATHE, a word uſed in ſome counties in England, to ſignify a barn.

LEAF, a part of a plant, commonly very thin and flat, growing in the ſpring, and falling off in the autumn.

Leaves are the ornament of the twigs, and conſiſt of a very glutinous matter, being furniſhed every where with veins and nerves. Their office is to ſubtilize the nouriſhing ſap, and convey it to the little buds; and likewiſe they ſerve to cover the flowers and fruits with their ſhade, and keep them from other inconveniences; they are to trees what hair is to the human body.

Dr. Grew obſerves, that the fibres of leaves conſiſt of two general kinds of veſſels, namely, for ſap, and for air; and are ramified out of greater into leſs, as veins and arteries are in animals.

Mr.

Mr. Frederick of Augſbourg, a celebrated gardener, took from the tree a leaf of the opuntia or Indian fig-tree; and ſetting it in the earth, it immediately took root, and produced bloſſoms and fruit.

The diſtinction of leaves, made by thoſe who have written on botany, are the following.

A ſimple leaf is that which is not divided to the middle.

A compound leaf is divided into ſeveral parts, each reſembling a ſimple leaf, as in liquorice, &c.

A digitated leaf is a compound leaf divided into ſeveral parts, all of which meet together at the tail, as in the hemp, black hellebore, &c.

A trifoliated leaf is a digitated leaf, conſiſting of three fingers, as the trefoil, &c.

A quinquefoliated leaf is a digitated leaf, conſiſting of five fingers, as in the quinquefolium.

A pennated leaf is a compound leaf divided into ſeveral parts, each of which is called a lobe, placed along the middle rib, either alternately, or by pairs. When the middle rib is terminated by an odd lobe, it is ſaid to be unequally pennated, as in the goats rue, &c. and equally pennated, when it is not terminated by an odd lobe, as in the caſſia; when the lobes are all nearly of the ſame form and bigneſs, it is called an uniform pennated leaf, as in the liquorice; when they are not ſo, it is ſaid to be diſform, as in the agrimonia.

A winged leaf is, as it were, divided into ſeveral pennated leaves, as in the orobus, &c.

A ramoſe leaf is that which is ſtill farther divided than the winged leaf, as in the oſmund royal, female fern, &c.

An entire leaf or lobe is that which has no diviſion on its edges, as in the apple-tree, &c.

A ſinuated leaf is that which is cut about the edges into ſeveral long ſegments, as in common mallows.

A ſerrated leaf is that which is cut about the edges into ſeveral acute ſegments, reſembling the teeth of a ſaw, as in the nettle, &c.

A crenated leaf is that which is cut about the edges into ſeveral obtuſe ſegments, as in the betony, &c.

A lacinated or jagged leaf is that which is cut about the edges into ſeveral pretty deep portions, in an irregular manner, as in the horned poppy, &c.

If the ſurface of the leaves are altered, by reverſing the branches of trees on which they grow, the plants are ſtopped in their growth, until the footſtalks are turned, and the leaves recover their former poſition. This ſhews how neceſſary it is to ſupport all thoſe weak ſhoots of plants, which are naturally diſpoſed for upright growth, which either twine about the neghbouring trees for ſupport, or that put out claſpers, by which they take hold of whatever trees or plants grow near them, and are thereby ſupported; and, on the contrary, how abſurd is that practice of tying up the ſhoots of thoſe plants which are naturally diſpoſed to trail upon the ground, for in both theſe caſes nature is reverſed, and conſequently the growth of both ſorts of plants is greatly retarded.

This is one of the great functions for which the leaves of trees and plants are deſigned; but, beſides this, there are others of equal importance to the weil-being of plants and fruits; the firſt is, that of the footſtalks and leaves nouriſhing and preparing the buds of the future ſhoots, which are always formed at the baſe of thoſe footſtalks, and during the continuance of the leaves in perfect health, theſe buds increaſe in their magnitude; and, in the deciduous trees, are brought to maturity before the footſtalks ſeparate from the buds in autumn; but if by accident the leaves are blighted, or if the entire ſurface of the leaves are cut off, and the footſtalks are left remaining, the buds will decay for want of that proper nouriſhment which is conveyed to them from the leaves; ſo that whenever trees are diveſted of their leaves, or thoſe leaves are cut, or otherwiſe impaired, though it may in either caſe happen when the buds may be nearly formed, yet if it is before the footſtalks ſeparate naturally from their branches, the future ſhoots will be weakened in proportion to the time when this is done; therefore from all the experiments which have been made in order to know how ſerviceable the leaves of trees and plants are to their well-being, it has been found, that when the plants have been diveſted of their leaves, or their leaves have been eaten or cut, during their growth, the plants have been remarkably weakened thereby. This ſhould teach us not to pull or cut off the leaves of trees, or plants, on any account, while they retain their verdure, and are in health; and this ſhews how abſurd that common practice is, of feeding down wheat in the winter and ſpring with ſheep; for by ſo doing, the ſtalks are rendered very weak, and the ears are in proportion ſhorter; nor are the grains of corn ſo plump and well nouriſhed, as that which is not fed down upon the ſame ground: this is a fact which we can aſſert from many years experience. It is very evident, that graſs which is often mowed, the blades will be rendered finer in proportion to the frequency of mowing it, yet the ſpecies of graſs is the ſame with that on the richeſt paſtures; ſo that although this may be a deſirable thing for lawns, &c. in gardens, yet where regard is had to the produce, this ſhould be avoided.

Another principal uſe of the leaves, is to throw off by tranſpiration what is unneceſſary to the growth of the plants, anſwering to the diſcharge made by ſweat in animal bodies; for as plants receive and tranſpire much more, in equal time, than large animals, ſo it appears how neceſſary the leaves are to preſerve the plants in perfect health; for it has been found by the moſt exact calculation, made from repeated experiments, that a plant of the ſun-flower receives and perſpires, in twenty-four hours, ſeventeen times more than a man.

We ſhall beg leave to mention a few, out of the many experiments which have been made by M. Bonnet, of Geneva, to prove that moſt leaves imbibed the moiſture of the air on their under ſurface, and not from their upper; they are as follows:

He gathered the leaves of ſixteen ſorts of herbaceous plants when fully grown; of each he put ſeveral leaves upon the ſurface of water in glaſs vaſes, ſome were poſited with their upper ſurface, and others with their under ſurface upon the water; theſe were adjuſted exactly to the ſurface of the water, with great care not to let any moiſture reach their oppoſite ſurfaces, and the ſame care was taken to prevent their footſtalks from receiving any moiſture. The glaſſes in which theſe leaves were thus placed, were kept in a cloſet, where the air was very temperate; and as the water in the glaſſes evaporated, there was, from time to time, a ſupply of freſh, which was added with a ſyringe, ſo that the leaves were not diſturbed. The leaves were taken from the following plants; the plantain, the mullein, the wake-robin, the great mallow,

low, the nettle, the marvel of Peru, the kidney-bean, the ſun-flower, the cabbage, the baum, the cock's-comb, the purple leaved amaranth, ſpinach, and the ſmaller mallow.

Six of theſe ſorts he found continued green a long time, and theſe were with different ſurfaces upon the water: they were of the following ſorts, the wake-robin, they kidney-bean, the ſun-flower, the cabbage, ſpinach, and the ſmall mallow; among the others, the following ſorts were found to draw the moiſture better with their upper than with their under ſurface, the plaintain, the mullein, the great mallow, the nettle, the cock's-comb, and the purple amaranth.

The leaves of the nettle, whoſe under ſurfaces were placed upon the water, were decayed in three weeks; whereas thoſe whoſe upper ſurfaces touched the water, laſted three weeks.

The leaves of the mullein, whoſe under ſurfaces were next the water, did not continue freſh more than five or ſix days, whereas thoſe whoſe upper ſurfaces were next the water, laſted five weeks.

The leaves of the purple amaranth, whoſe upper ſurfaces were next the water, continued freſh three months; whereas thoſe whoſe under ſurfaces touched the fluid, were decayed in a week.

The leaves of the marvel of Peru and the baum, appeared to have the advantage, whoſe under ſurfaces were next the water.

The leaves of the wake-robin, and of the cock's comb, whoſe footſtalks only were put into the water, continued freſh a longer time than thoſe which were placed with either ſurface upon the water.

The leaves of the great mallow, the nettle, the ſun-flower, the marvel of Peru, and the ſpinach, whoſe footſtalks were plunged into the water, continued freſh a ſhorter time, than thoſe which had either of their ſurfaces upon the water.

The leaves of the mullein, plantain, and amaranth, which received the water at their footſtalks, continued freſh much longer than thoſe whoſe under ſurfaces touched the water.

It is not difficult to explain the reaſon of this fact; for the orifices of the ſap-veſſels in the footſtalks are much larger than thoſe of either ſurface, ſo that the water inſinuates itſelf in greater quantities, and with more eaſe, in the firſt than by the ſecond way.

After this the ſame gentleman made experiments on the leaves of ſixteen ſorts of trees and ſhrubs, of the following ſorts: the lilac, the pear-tree, the vine, the aſpin, the laurel, the cherry-tree, the plum-tree, the horſe-cheſnut, the white mulberry, the lime-tree, the poplar, the apricot, the walnut, the filbert, the oak, and the creeper.

Among theſe ſpecies he found, that the lilac, and the aſpin, imbibed the water equally with either their upper or under ſurface; but in all the other ſorts, the under ſurfaces imbibed it in much greater quantities than the upper. The difference was very remarkable in the leaves of the white mulberry, for thoſe whoſe upper ſurfaces were laid upon the water, faded in five days; whereas the others, whoſe under ſurfaces were next the water, preſerved their verdure near ſix months.

The vine, the poplar, and the walnut, afforded very remarkable inſtances, how little diſpoſed the upper ſurfaces of the leaves of ligneous plants are to imbibe the moiſture: for the leaves of theſe three ſorts, whoſe upper ſurfaces were applied to the water, decayed almoſt as ſoon as thoſe which had no nouriſhment.

In all the experiments made by this curious gentleman upon the various leaves of trees and herbs, it is remarkable that all thoſe leaves, which imbibed their moiſture by their upper ſurface, were ſuch as had that ſurface covered over with hairs or down; and, on the contrary, where the under ſurface was garniſhed with either hairs or down, the nouriſhment was imbibed by that ſurface. He alſo mentions many experiments made by himſelf, and alſo by M. Duhamel de Monceau, of the Royal Academy of Sciences at Paris, in rubbing the leaves over with varniſh, oil, wax, and honey, to ſee the effect of theſe upon various leaves, ſome of which were rubbed over on both ſurfaces, others only upon one; ſome only a part of the ſurfaces, others the edges of the leaves were rubbed over, and in ſome only the footſtalks of the leaves. They likewiſe anointed the trunks of ſome trees and ſhrubs, leaving the leaves and branches in their natural ſtate.

The reſult of theſe experiments was, that where the leaves were covered with varniſh on both ſides, they preſently decayed; and where they were anointed with other things, the leaves continued a ſhorter time than others, in proportion as the things were more penetrating; and where one ſurface only was anointed, they continued much longer than thoſe which were anointed on both; and where the pedicle alone was anointed, they continued ſtill longer: but the anointing of the trunks made no ſenſible alteration, except in very hot weather; when they were both of opinion the anointing them were of ſervice, by hindering the too great tranſpiration, which tend to weaken the trees: for they obſerved, that thoſe trees which were varniſhed, ſuffered leſs from the violent heats, than the trees which were left in their natural ſtate.

M. Bonnet alſo obſerved, that the tender parts of the leaves which were varniſhed were deſtroyed by it, and the tough fibres only left remaining.

We may therefore reaſonably conclude, that one great uſe of leaves is what has been long ſuſpected by many, viz. to perform, in ſome meaſure, the ſame office for the ſupport of vegetable life, as the lungs of animals do for the ſupport of animal life: plants, very probably, drawing through their leaves ſome part of their nouriſhment from the air. *Miller's Gard. Dict.*

LEAP, or *Lip*, half a buſhel.

LEASE, *Lea*, *Lay*, or *Ley*, implies graſſy ground, meadow ground, or unploughed ground, kept for cattle.

LEASE alſo ſignifies the letting of lands, tenements, &c. unto another for life; a term of years, under a reſerved rent.

LEES, the more groſs and ponderous parts of liquors, which, being ſeparated by fermentation, fall to the bottom.

The lees of wine, beer, ale, and oil, are excellent manures.

LEET, a little court held within a manor, and called the king's court, on account that its authority to puniſh offences originally belonged to the crown, and from thence deſcended to inferior perſons.

LENTIL, or *bitter Vetch*, the name of a plant of the vetch or tare kind, cultivated in ſome parts of England as fodder for cattle.

Lentils grow to a foot or a foot and a half high, with ſtalks and leaves like thoſe of tares, but ſmaller; and like them they bear their ſeeds, generally three or four in little pods.

pods. These ſeeds are round, hard, ſmooth, and flat, but thicker at the ſides. There are two ſorts of lentils, the white and yellow; but the latter affords the greater quantity of fodder.

The ſeeds of this plant are commonly ſown in March, where the land is dry, but in moiſt ground the time is in April. The uſual quantity of ſeed allowed to an acre of land is from one buſhel and a half to two buſhels. If theſe are ſown in drills in the ſame manner as peaſe, they will ſucceed better, than when they are ſown broad-caſt. The drills ſhould be a foot and a half aſunder, to allow room for the hoe to clean the ground between them; for if the weeds are permitted to grow among them, they will get above the lentils, and ſtarve them. *Miller's Gard. Dict.*

LIME, a ſoft friable ſubſtance, obtained by calcining or burning ſtones, ſhells, and the like.

The moſt certain way to know whether any ſort of ſtone be fit for making lime, is to drop upon it a little aqua-fortis, ſpirit of ſea-ſalt, or oil of vitriol. All ſtones on which the above, or any other ſtrong acid efferveſces or riſes in bubbles, are lime-ſtones, or will burn to lime; and the ſtronger the efferveſcence is, the fitter they are for that purpoſe. All country gentlemen ſhould keep ſome ſuch ſpirit by them, to try the nature of the ſtones that may be found on their eſtates.

All lime is a very good manure, but that made of ſtone is much better than what is made of chalk. It makes the greateſt improvement upon light ſandy ſoils, or upon a dry gravel; wet and cold gravel is leſs benefited by it, and cold clay the leaſt of all. The common allowance is a buſhel to a pole ſquare, or a hundred and ſixty buſhels to an acre. Mr. Lummis laid after the rate of three hundred buſhels on an acre, and found it anſwer extremely well: but that was upon a ſtrong clay. His method of uſing it, as communicated to the Edinburgh Society, and the reſult, he ſays, of what he had experienced to be beſt, is as follows:

In the month of October, he lays together three or four of the largeſt ſtones (burnt into lime) on the ſward or turf of a ſtrong clay ground; or as many of the ſmall ſtones as are equal to the large ones, ſo that ſeventy or eighty bolls (two hundred and eighty, or three hundred and twenty buſhels) may complete an acre. If rain falls, it melts immediately; if not, it will melt and ſlake in forty-eight hours, or leſs, according to the moiſture of the air. He then ſpreads it directly, leaving no part of it upon the ſpot where the ſtones were laid. This done, he lets it lie twelve months, or till the month of November after the October twelve months, when he ploughs it in, and lets it remain in that ſtate all the winter, during which froſts and rains mellow and prepare the ground for the next ſpring ploughing, and render it fit for barley. He prefers this method to laying the lime on in powder, becauſe, in this laſt way, it is apt to be blown about with the wind, to the great detriment of both men and horſes, ſuch as ſpoiling the men's eyes, hair, and cloaths, and the eyes and hair of the horſes, making their coats look dry and ugly, beſides loſing much of the lime.

The lime laid in the month of October, as above directed, on a ſtrong arable land, which has been ſome years under graſs, and continuing ſpread for about twelve months before it be ploughed in, has been found ſo to alter the graſs to a fine natural clover, that, by feeding of ſheep or black cattle upon it, it has paid the whole charge the firſt year by the graſs, and cattle will chooſe rather to feed on this ground than any other, and grow fatter. If the ground be looſe and open, it may be ploughed in the enſuing March, if limed in October. In either way, it ſo far meliorates the ſward, and the ſoil, that the beſt of crops may be expected for three or four years; and by laying ſome dung upon it the 4th or 5th year, two or three crops more may be obtained; after which the ground will be in excellent order to lay down with graſs ſeeds.

Notwithſtanding that lime is ſo very good a manure, Mr. Lummis prefers marle, if it can be had within the ground, or near the place where it is to be uſed; for tho' it be more chargeable at firſt, yet, laſting five times as long, it is in the end much cheaper. He generally lays near two hundred loads of it upon an acre, at about ſeven or eight buſhels to the load.

Mr. Evelyn adviſes mixing the lime with the turf or ſward, laying them alternately, turf on lime, and lime on turf, in heaps for ſix months; by which means it will become ſo rich and mellow, as to diſſolve and run like aſhes, and carry a much more cheriſhing vigour, than if uſed alone in a greater quantity, and without danger of burning out and exhauſting the vegetative virtue which it ſhould preſerve. It is likewiſe greatly bettered by being mixed with dung, or with mud drawn from the bottom of ponds or rivers. In Weſtmorland, they reap fine crops of barley from their ſandy lands, by manuring them with lime and cow-dung mixed together.

The nature of lime on land is like that of chalk: it works downwards, as the farmers expreſs it, and is therefore beſt treated in the ſame manner, laying it upon a lay the year before it is to be ploughed up. When uſed on land which lies upon a deſcent, it ſhould by all means be mixed with dung, and laid principally on the higher part of the land; the conſequence of which will be, that the rain will waſh out the virtues of the lime and dung together, and carry them to the lower parts as it runs down. In fact, it does better on any land, when mixed with dung, than either of them alone. This is particularly obſerved in Shropſhire, where they lay dung and lime together, about twenty loads of the former, and only twenty buſhels of the latter, on an acre of ground. In Leiceſterſhire, they ſow or ſcatter the lime on wheat land when they ſow the wheat; but on barley-land, the laſt earth but one, leſt it ſhould burn the barley if ſowed with it in the ſpring. They allow five quarters to an acre of each, reckoning by the meaſure in which it comes from the kiln; for after it is ſlaked, thoſe five quarters will make near ten.

Lime is thought to make corn grow with a thin huſk. It is a great deſtroyer of moſs and ruſhes, even after it has been ſlaked; as quick lime is of the remnants of furzes, after the old buſhes have been grubbed up. Its hot quality renders it apt to over-burn dry ſoils. It certainly is moſt efficacious when ſpread directly from the kiln.

Mr. Liſle, whoſe account of lime is almoſt unintelligibly perplexed and confuſed, thinks it is beſt, eſpecially on lands that work mellow, to ſpread and plough in this manure as ſoon as it is ſlaked, rather than to let it lie long in heaps covered with earth. He very properly gives it as a rule to all huſbandmen, to be cautious of liming ground, and then ploughing out the heart of it; the bad conſequences of which he himſelf experienced. "I limed, ſays he, ſome years ago, in Wiltſhire, ſeven

acres for an experiment, and laid down one acre to its own natural graſs. In two years time this graſs was, and ſtill is, worth forty ſhillings an acre. The third year, I laid down another acre, which is ſtill worth thirty ſhillings a year. The reſt, which I ploughed five or ſix years longer, is not worth fifteen groats an acre. I have experienced the like in burn-baking ground."

The practice of Lower Normandy, where lime is chiefly uſed on lands newly broken up, is thus related by M. Du Hamel.

After giving theſe lands a ſhallow ploughing, they carry on the lime as it comes from the kiln, and lay about an hundred weight of it in a heap on every ſquare perch; ſo that the heaps lie at a perch diſtant from one another; they then raiſe the earth all round the heaps, like ſo many baſons: the earth which forms the ſides of theſe baſons ſhould be a foot thick: and, laſtly, they arch the heaps over with earth, ſix inches thick. The lime ſlakes under this covering, and is reduced to powder; but at the ſame time it increaſes in bulk, and thereby cracks the earth. If theſe cracks be not carefully ſtopped, rain will get through them, and reduce the lime into a paſte, or kind of mortar, which will not mix with the earth, or anſwer the end propoſed. Farmers are therefore very careful to examine the heaps from time to time, and ſtop the cracks. Some only preſs down the top of the heap with the back of a ſhovel: but this method is liable to a conſiderable inconvenience; for if the lime be in a paſte within the head, it is by this means beat together in ſuch manner, that it becomes ſtill more difficult to mix it with the earth: for which reaſon it is better to ſtop the crevices, by throwing a little freſh earth over the heap.

When the lime is thoroughly ſlaked, and reduced to powder, the heaps are cut with a ſhovel, and the lime is mixed as well as poſſible with the earth that covered it. This mixture is then thrown up in heaps again, and left expoſed to the air for ſix weeks or two months; for then the rain will not hurt it.

About the beginning of June, this compoſt of lime and earth is ſpread upon land: but not by throwing it about unequally, or at random: on the contrary, it is taken up by ſhovelfuls, and diſtributed in little heaps, at equal diſtances, on each perch of ground, it having been obſerved, that theſe little heaps promote vegetation, more than if the manure was ſpread uniformly all over the field; nor is it at all heeded, if ſmall intervals remain unlimed between each ſhovelful. The field is afterwards ploughed, for the laſt time, very deep: then, towards the end of June, it is ſown with buck-wheat, which is covered with a harrow; and if any clods remain, they are broken with a hoe.

Buck-wheat occupies the land about a hundred days; ſo that this grain, ſown about the end of June, is gathered about the end of September. When the ſtalks and roots of this plant are dead and dried, the ground is ploughed up, and immmediately ſowed with wheat, which is harrowed in. After the wheat has been reaped, the land is ploughed as ſoon as poſſible. It is ploughed for the laſt time, in February or March, in order to ſow oats; or in April for barley: but in this caſe it is turned up two or three times, to make it fine. All theſe different grains are harrowed in. A roller is paſſed over the oats when they are come up; and if any clods remain in the barley, they are broken with a hoe.

In the next February or March the land is ploughed again, in order to ſow it with grey peaſe or vetches: and after theſe pulſe have been reaped, one or two ploughings are given, to prepare it for wheat in the enſuing autumn.

The next year oats are ſowed, ſometimes mixed with a little clover; and then the ground is laid down to paſture for three or four years.

Sometimes no buck-wheat is ſowed on land newly broken up; but it lies fallow, from the month of March, when it was firſt ploughed, till October, when it is ſowed with wheat, after receiving ſeveral ploughings during the intermediate time. Theſe lands being, by this means, brought to a tolerable tilth, not above three quarters of the quantity of lime above-mentioned is uſed on them, and they generally bear a better crop than thoſe which are firſt ſowed with buck-wheat.

Some farmers think a perch too great a diſtance for conveniently ſpreading the lime. They therefore make the heaps leſs, and increaſe their number in proportion. Others lay their lime in ridges, from one end of the field to the other; which facilitates the ſpreading of it. Being perſuaded that lime is moſt efficacious when it lies ſhallow in the ground, they firſt plough it in, and then give a ſecond ploughing before they ſow, which brings it again near the ſurface.

Lime is commonly ſaid to enrich land greatly at firſt, but afterwards, when its efficacy is exhauſted, to leave the ground more barren than it was before. Lime readily unites with every unctuous ſubſtance, and renders it more ſoluble in water. By this means, all ſuch particles mixed with the ſoil may be more ſpeedily converted to the nouriſhment of vegetables, than they might otherwiſe be. Indeed, if the farmer's avarice, or want of judgment, tempt him to over-crop the ground, it may be left without matter fit to nouriſh plants, till a freſh ſupply is brought; but if it be judiciouſly cropped, and left in good heart under graſs, or any other produce which does not impoveriſh the ſoil, the effect of the lime will be more durable, and more advantageous than is generally imagined.

LIME-KILN. *See the article* KILN.

LIME-STONE, a ſpecies of ſtone which will burn into lime. *See the article* LIME.

LIME-TREE, or *Linden-Tree*, a beautiful tree for walks, and other decorations, in parks, &c. and of which Mr. Miller has enumerated four ſpecies.

All the ſpecies of the lime-tree are eaſily propagated by layers, which will, in one year, take good root, and may then be taken off, and planted in a nurſery, at four feet diſtant row from row, and two feet aſunder in the rows. The beſt time to lay them down, and to remove them, is, when their leaves begin to fall, that they may take root before the froſt comes on, though they may be tranſplanted any time from September to March, in open weather; but if the ſoil be dry, it is much the better way to remove them in autumn, becauſe it will ſave a great expence in watering, eſpecially if the ſpring ſhould prove dry. In this nurſery they may remain four or five years, during which time the ground ſhould be dug every ſpring, and conſtantly kept clear from weeds, and the large ſide ſhoots pruned off, to cauſe them to advance in height; but the ſmall twigs muſt not be pruned off from the ſtems, becauſe theſe are abſolutely neceſſary to detain the ſap, for the augmentation of their trunks, which are apt to ſhoot up too ſlender, when they are entirely divelted

veſted of all their lateral twigs. If the ſoil in which they are planted, be a fat loam, they will make a prodigious progreſs in their growth, ſo that in three years time they will be fit to tranſplant out where they are to remain.

They may alſo be propagated by cuttings; but as this method is not ſo certain as by layers, the other is generally practiſed. In order to obtain proper ſhoots for laying down, a lime-tree is cut down cloſe to the ground, from the roots of which a great number of ſtrong ſhoots are produced the following year; theſe will be large enough to lay down the ſucceeding autumn, eſpecially if the ſmalleſt of them are cut off cloſe early in the ſpring; for when too many ſhoots are ſuffered to grow during the ſummer, they will be much weaker, than if only a ſufficient quantity be left. For the manner of laying down theſe ſhoots, *ſee the article* LAYER.

The timber of the lime-tree is uſed by carvers, it being a ſoft, light wood, as alſo by architects for framing the models of their buildings; the turners likewiſe uſe it for making light bowls, diſhes, &c. but it is too ſoft for any ſtrong purpoſes. *Miller's Gard. Dict.*

LINDEN-TREE. *See the preceding article.*

LING, heath,

LINSEED, the ſeed of the flax. *See the article* FLAX.

LIQUORICE, a plant propagated for medicinal uſes. It grows to about four or five feet high; its ſtalks are hard and woody; its leaves ſmall and roundiſh, ſtanding together on the two ſides of a rib, and making what botaniſts call a winged leaf.

A correſpondent of the editors of the Muſeum Ruſticum has given the following directions for cultivating this plant, founded on a long ſeries of experience.

"The common culture of liquorice is not difficult to be learned; and this with proper attention, will enable any thinking farmer, that knows his buſineſs, to cultivate it to advantage.

"This plant thrives beſt on a deep, looſe, rich mould; and if it is freſh land, that has not for many years borne corn, the profit will be the greater, as the crop will be larger, and the roots of a finer quality.

"A rich ſandy ſoil, provided it is deep, will do well for this plant; and it muſt always be remembered, that too much moiſture is its greateſt enemy: let no one therefore attempt to plant it on a damp clay, leſt the whole crop be cankered.

"Land cannot be made too fine, nor dug too deep, for liquorice: it ſhould be, at leaſt, moved with the ſpade to the depth of two feet and a half, and if a little deeper, ſo much the better.

"If the land, on which the liquorice ſets are to be planted, is freſh, rich, and in good heart, it needs no manure for the firſt crop; but if it has been for ſome years in tillage, the planter will do well to give it, in the ſummer time, a good dreſſing of very rotten dung, lime, and coal-aſhes, or ſoot, mixed together, ſome months before, in a compoſt: the quantity muſt be regulated by the ſtate of the land, always remembering that this plant requires a great deal of nouriſhment, and is a great impoveriſher of land, though it extracts much of its nouriſhment, or food, from a conſiderable depth, at a diſtance from the ſurface; ſome of the roots running five or ſix feet, at leaſt, into the ground.

"When the ground is properly prepared, reduced to a very fine tilth, and laid level, ſome liquorice runners, or ſets, are to be procured. Theſe muſt be cut into pieces, about eight or nine inches long each, and planted in rows, with dibbers armed with iron points. I make my rows two feet aſunder, put my ſets fifteen inches from each other, and when three rows are planted on a ſix-feet bed, I allow two feet more of interval betwixt bed and bed.

"When I put in my ſets with the dibber, I leave the upper end of each ſet juſt level with the ſurface of the ground: I ſhould have obſerved, that I have all my ſets carefully inſpected before they are carried into the field, to ſee that each of them has one, if not two eyes, or buds, without which they would make no ſhoots.

"When the whole ſpot of ground is planted, I make my labourers dig up the intervals one ſpit deep, and ſpread the earth on the beds: this raiſes them about two inches above the head of the ſets, and by lowering the intervals, ſerves in wet ſeaſons to drain the beds. I generally contrive to get this work done by the laſt week in September; but in favourable years, the middle of October is not too late.

"If the weather proves mild, I have no farther trouble with them during the winter; but if it is likely to freeze hard, I cover the beds with peaſe-haulm, or long dung, or ſome ſuch matter, to forward the growth of the roots in the ſpring, and protect them during the winter, from the froſts.

"Early in the ſpring, on the firſt appearance of the weeds, I allow my liquorice a thorough hoeing; and this is ſeveral times repeated in the dry weather of the ſummer.

"The winter following, I again cover them with long dung, and in the ſpring, before the roots begin to ſhoot, I have the ſpaces betwixt the rows on the beds looſened with a ſpade, and the intervals are well dug: immediately after which, I give the land a ſlight dreſſing of coal-ſoot, ſown by hand: it ſhould be thick enough to make the land look black: this the firſt rains waſh in, and it greatly warms and invigorates the plants.

"The ſecond and third ſummers, all I have to do, is to keep my crop clear of weeds: this indeed, is very neceſſary, and the hoeings for this purpoſe muſt be more or leſs frequent, according to the ſeaſon; generally, three times in the ſummer are quite ſufficient, eſpecially if the land was well prepared before the ſets were planted.

Many good ſenſible farmers, whom I have known to cultivate this plant, in autumn have a practice of cutting down the ſtalks, whilſt they are in full ſap, thinking thereby to ſtrengthen the roots. I differ from them, however, in opinion, and am rather apt to imagine, that this cutting of the ſtalks, whilſt the ſap is in motion, muſt be prejudicial to the roots. It is, therefore, my cuſtom, always to defer cutting off the ſtalks, till they are withered, and begin to decay; nature then indicating, that an abſtraction will be of ſervice.

"Theſe roots ſhould have three ſummers growth before they are fit to take up: it is very ſeldom that they have attained a proper ſize at two years end; and if you leave them longer than three years in the ground, the roots are apt to grow ſticky, and loſe a part of their ſaccharine quality.

"I never take them up till the ſap is entirely at reſt, and the leaves and ſtalks are withered: they are then in prime order, and fitteſt for ſale.

"If theſe roots are taken up while the ſap is in motion, either early in the autumn, or late in the ſpring, they are apt

apt to ſhrivel, and loſe much of their weight, and are, beſides, more diſpoſed to ferment and periſh.

"The beſt way of taking them up is, to dig the ground over as deep as the principal roots run, having pickers ready to gather up the roots as faſt as they are thrown up by the ſpade.

"My general practice is to get rid of my roots as ſoon as I conveniently can: and I find it better ſo to do, than to wait for the riſing of the markets. I have had, from one acre of fine, freſh, rich land, above 3000 pounds of ſaleable root, which has produced me above ſixty pounds; but this many years ago, my crops not being generally now ſo large.

"When I have taken up a crop of this root, if it was planted on freſh land, I generally prepare the ſame ground to yield me another crop; and this takes me near a year.

"I, in the firſt place, give it, during the winter froſts, a thorough good dreſſing of well-rotted dung, mixed with lime: of this I lay on large quantities, ſtill having regard to the condition of the ſoil, and ploughing it well in the enſuing ſummer.

"In ſuch looſe ſoils, as are proper for this plant, there is no occaſion to dig the land for this crop, the taking up the roots having ſtirred it to a great depth: this, with three or four ſummers ploughings, is ſufficient.

"As to the reſt, I manage the ſame as I did for the preceding crop.

"If the land, which has borne me a crop of liquorice-root, was not freſh land when it was planted, but had been any time in tillage, I ſcarcely ever chuſe to plant it again with the ſame crop, without allowing ſeveral years of interval, at leaſt ſeven; but in this caſe, I frequently ſow oats in the ſpring, to abate the rankneſs of the ſoil; and it will then, with a very ſlight dreſſing, give me a good crop of wheat.

"In my method of cultivating this plant, I alway allow ſpace enough for the roots to extend in ſearch of food; and this is my reaſon for planting my rows at two feet diſtance: I am, beſides, very careful of keeping them clear of weeds, and that, particularly, during the firſt ſummer; being very ſenſible that, without this precaution, they would be in great danger of being choked up, and robbed of their proper ſhare of nouriſhment; particularly, they would receive no benefit from the dews, which are ſo friendly to vegetation; and even the ſun's warmth would be, in a great meaſure, kept from the roots by the ſhade of the weeds.

"Many, who plant liquorice, allow much leſs ſpace than I do betwixt the rows, and will yet, the firſt ſummer, take off a crop of onions, or ſpinage, or young carrots, and think it ſo much clear profit; but the queſtion is, whether theſe crops may not, during the time they are on the ground, be, to all intents and purpoſes, deemed weeds, having nearly, if not altogether, as bad effects, as weeds would if permitted to grow with the crop.

"Some, worſe farmers, continue this practice two years of its growth; but it is quite needleſs to condemn this method of culture, as it cannot but ſtand ſelf-condemned.

"In the dreſſings I give my land, for preparing it to receive this plant, experience has convinced me that lime is a much ſweeter manure than ſtable-dung: in fact, this laſt is not, on any account, to be uſed till it is quite rotten, and then lime is very properly added to it as a corrector.

"Some friends of mine, who live very near London, have attempted to cultivate this plant on their lands; but they find it does not anſwer; and this, on account of the great richneſs of the ſoil, owing to the great quantity of London dung laid on it. It is true, the roots were at three years end larger than mine; but they were not ſo bright, had a blacker coat, and were deemed greatly inferior in quality.

"Should any of your readers be inclined to cultivate this plant, by following theſe directions, not implicitly, but according to their diſcretion, the circumſtances of their ſoil, &c. conſidered, they cannot well fail ſucceeding." *Muſeum Ruſticam, vol.* I. *p* 252.

Liquorice loſes greatly in weight, if kept in a dry place. In order to diſcover how much it waſted I made choice of a piece of a ſingle root 13 inches long, and full $\frac{3}{4}$ inch diameter throughout, which weighed five ounces; and nine ſmall roots, 13 inches long each, and from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch in diameter; they weighed alſo five ounces. All theſe were put into a drawer in a dry room, the beginning of February, and were weighed the beginning of Auguſt following, and then the largeſt ſingle root weighed two ounces and three quarters, and the nine ſmall roots alſo weighed full 2 $\frac{3}{4}$ ounces; ſo that in ſix months theſe roots loſt almoſt half their weight. They were green and juicy when put into the drawer, and were now pretty dry and hard, but not quite ſo dry and hard as ſome of the ſame liquorice that had lain all that time in the open room.

But liquorice may be kept in moiſt ſand, or laid in the earth as long, with very little waſte or loſs of weight.

As liquorice is an upright growing plant, and not apt to lodge, and its roots deſcending deep, it is very proper for the horſe-hoing culture, in which it will arrive to greater perfection than in the uſual method of cultivating it, as deſcribed above.

In Yorkſhire, where liquorice is cultivated in a rich ſandy ſoil, its roots penetrate to the depth of three or four feet, ſometimes more, and the digging the ground all over to that depth, when the liquorice is taken up, is very expenſive. As a ſaving in this article, the planters in digging up the ground, lay it in a proper form and replant it, making one digging ſerve for both purpoſes, which is a very good way; but they ſet the plants much too cloſe; whereas if they planted it in rows, at about four feet diſtance, or more, and horſe-hoed it, the weeds might be deſtroyed, and the land greatly improved, eſpecially if trench-hoed; and the produce would be very great, after ſo fine a preparation of the land by digging. Add to this, that the method of cultivation by the hoe-plough is much cheaper than by hand-work.

LITTER, the ſtraw laid under horſes, &c.

LIZENED *Corn*, leſſened, ſhrunk, or lank corn.

LOAM, an earth compoſed of diſſimilar particles, hard, ſtiff, denſe, and rough to the touch, and compoſed of ſand and a tough viſcid clay.

LOE, a little round hill, or heap of ſtones.

LOG, a large, ſhapeleſs piece of wood.

LOOP, a hinge of a door.

LOP, a flea.

LOPPED *Milk*, ſuch as ſtands till it ſours and curdles of itſelf.

LOPPING, the cutting off the ſide branches of trees.

It

It is very obſervable that moſt old trees are hollow within; which does not proceed from the nature of the trees, but is the fault of thoſe who have the management of them, who ſuffer the tops to grow large before they lop them; as the aſh, elm, hornbeam, &c. and perſuade themſelves, that they may have the more great wood; but in the mean time, do not conſider that the cutting off great tops endangers the life of a tree; or, at beſt wound it ſo, that many trees yearly decay more in their bodies than the yearly tops come to; and at the ſame time that they furniſh themſelves with more great wood, they do it at the loſs of the owner. And, indeed, though the hornbeam and elm will bear great tops, when the body is little more than a ſhell; yet the aſh, if it comes to take wet at the head very rarely bears more top after the body of the tree decays. Therefore, if once theſe trees decay much in the middle, they will be worth little but the fire; ſo that if you find a timber-tree decay, it ſhould be cut down in time, that the timber be not loſt.

The lopping of young trees, that is, at ten or twelve years old at moſt, will preſerve them much longer, and will occaſion the ſhoots to grow more into wood in one year, than they do in old tops at two or three. Great boughs, ill taken off, ſpoil many a tree; for which reaſon they ſhould always be taken off cloſe and ſmooth, and not parallel to the horizon; and cover the wound with loam and horſe-dung mixed, to prevent the wet from entering into the body of the tree.

When trees are at their full growth, there are ſeveral ſigns of their decay; as the withering or dying of many of their top branches: or if the wet enters at any knot; or they are any wiſe hollow, or diſcoloured; if they make but poor ſhoots; or if woodpeckers make any hole in them.

This lopping of trees is only to be underſtood for pollard-trees; becauſe nothing is more injurious to the growth of timber-trees, than that of lopping or cutting off great branches from them. Whoever will be at the trouble of trying the experiment upon two trees of equal age and ſize, growing near each other, to lop or cut off the ſide branches from one of them, and ſuffer all the branches to grow upon the other, will in a few years, find the latter to exceed the other in growth every way; and this will not decay near ſo ſoon.

All ſorts of reſinous trees, or ſuch as abound with a milky juice, ſhould be lopped very ſparingly; for they are ſubject to decay when often cut. The beſt ſeaſon for lopping theſe trees is ſoon after Bartholomew-tide; at which time they ſeldom bleed much, and the wound is commonly healed over before the cold weather comes on. *Miller's Gard. Dict.*

The generality of the world are againſt pruning timber trees at all, and where they naturally grow ſtraight and regular, it is much better let alone. But all common faults in ſhape may be regulated by this lopping them while young, and it can be attended with no ill-conſequence to the timber; for the cut not lying near the timber pith cannot affect it, when grown up, and ſquared in the working for beams and other uſes, or to be quartered; for all the defects occaſioned by ſuch wounds, are in the ſuperficial parts, and all the four quarters are perfectly ſound within.

As to the largeſt foreſt trees, they ſhould not be lopped at all, except in caſes of great neceſſity, and then the large boughs muſt not be cut, but only the ſide branches; and even theſe muſt be cut off cloſe, that the bark may ſoon cover the wound, and yet a little ſlanting, that the water may run off, not lodge upon the cut part.

If there is a neceſſity of cutting off a large bough, as by its being broken or cankered, let it be cut off ſlanting at about four feet diſtance from the body of the tree, and that if poſſible near ſome place where there is a young ſhoot from it, which may receive the ſap, and grow up in its place. No ſtump muſt be left ſtanding out farther than this, becauſe they are wounded parts which never can heal, and which will always be letting in the water, and will ſerve as pipes to convey that water into the heart of the body of the tree, and by degrees will utterly ſpoil it. All that grow upright, whether they be large or ſmall branches, muſt in cutting be taken off ſlanting, never evenly, for the ſame reaſon; thoſe boughs that bear from the head are to be cut with the ſlope on the lower ſide, and on any occaſion that great wounds are given to a tree, they ſhould be covered with a mixture of clay and horſe-dung, which will make them heal much ſooner than they otherwiſe would do. *Mortimer's Huſbandry, vol.* II *p.* 91.

To LOWK, to weed corn.

LUCERN, a plant frequently cultivated in the manner of clover, and known among botaniſts by the names of medica and medicago.

It is the alſaſa of the Spaniards, and the lucern grand treffle, or fænum Burgundiacum, as ſome botaniſts call it, of the French. It has a perennial root, and an annual ſtalk, which riſes full three feet high in good land, and is garniſhed at each point with trifoliate leaves, whoſe lobes are ſpear-ſhaped, about an inch and a half long, and half an inch broad, ſawed towards the ſtalks. The flowers grow in ſpikes, which are from two to near three inches in length, ſtanding upon naked footſtalks two inches long, riſing from the wings of the ſtalks: they are of the pea-bloom, or butterfly kind; of a fine purple colour, and are ſucceeded by compreſſed moon-ſhaped pods, which contain ſeveral kidney-ſhaped ſeeds. It flowers in June, and its ſeed ripens in September.

There are the following varieties of this ſpecies of lucern, viz. one with violet-coloured flowers; another with yellow flowers; a third with yellow and violet flowers mixed; and a fourth with variegated flowers: but, as Mr. Miller obſerves, theſe are only variations of the ſame plant, ariſing accidentally from the ſeed. However, neither the yellow nor the variegated flowered lucern is ever ſo ſtrong as that with purple flowers; nor is it conſequently ſo profitable to the huſbandman.

Columella calls this the choiceſt of all fodder, becauſe it will laſt ten years, and will bear being cut down four and ſometimes ſix times a year; it enriches the land on which it grows, fattens the cattle fed with it, and is a remedy for ſick cattle. About three quarters of an acre of it is abundantly ſufficient to feed three horſes during the whole year. Yet, notwithſtanding it was ſo much eſteemed by the ancients, and hath been cultivated to great advantage in France and Switzerland for many years, it has not yet found ſo good a reception in England as it juſtly deſerves; nor is it cultivated here in any conſiderable quantity, though it will ſucceed as well in this country as in either of the laſt mentioned; being extremely hardy, and reſiſting the ſevereſt cold of our climate.

Mr. Rocque lays it down as a maxim in his practice, that lucern will grow on any ſoil, provided it be not ſo wet as to rot the roots.

The ſtrongeſt land is however to be preferred, and the deeper the ſoil the better will be the crop, as the roots will have room to extend themſelves.

The land ſhould be prepared in the ſame manner as for barley, being ploughed, harrowed, and cleaned from all ſorts of weeds; and the ſtronger the land is, of courſe the more ploughing and harrowing it will take to mellow it, ſweeten it, and bring it to a fine tilth.

When this work is done, the lucern ſeed muſt be ſown broad-caſt, (not in drills) in fine weather, after the rate of about fourteen pounds to an acre.

This allowance of ſeed will be ſufficient to ſupply the number of plants that will be wanted to yield a full crop; but they will not ſtand ſo thick as to ſtarve one another, though there is ſome allowance for part of the ſeed failing.

But ſhould every ſeed take, the method of culture hereafter recommended will ſufficiently reduce the number of the plants, and, without the trouble and expence of the New Huſbandry, give each plant ſpace enough to extend its roots, and collect the neceſſary quantity of nouriſhment.

To return to the culture, before the laſt ploughing, the land ſhould be manured, not with old rotten ſtuff as is uſual, but with freſh ſtable-dung, that has been thrown up in a heap three or four weeks to heat and ferment. This will enable the young plant to puſh forth its leaves and ſtalks with luxuriance, and get forward in its growth the firſt ſummer.

When the dung is in full fermentation, it is to be laid on the land, and ploughed in as ſoon as poſſible, that the ſalts of the dung may not have time to evaporate: the land muſt then be harrowed and ſown, and afterwards harrowed again with a light or buſh-harrow; and, laſtly, rolled to ſettle the ground and break the clods.

If corn is to be ſown amongſt it, it ſhould be only half a crop; otherwiſe it will be apt to deſtroy the lucern, eſpecially if it proves a wet ſeaſon, and the corn is rank: but if no corn is ſown amongſt it, the lucern will thrive much better.

Lucern may be ſown from the beginning of March to the end of May; but April, in dry weather, is the beſt time.

If much rain falls on the new-ſown lucern, it will be apt to ſwell too faſt, and burſt; but if it holds fine for three or four days, it will be in no danger.

Mr. Rocque does not approve of drilling the lucern, becauſe the roots are too much confined in the drills: they ſay it is to clean the lucern between the rows that they drill it; but it is for want of knowing the nature of lucern, and it diſcourages people from ſowing it, drilling and hoeing being very expenſive ways; the quickeſt and cheapeſt, and by much the beſt way, being to ſow it broad-caſt, like clover, as the roots will ſtand nearly at equal diſtances one from another every way.

Lucern requires, it is true, a grat deal of nouriſhment from the earth; but there is no occaſion this nouriſhment ſhould be ſupplied by the ſurface. It is well known that the roots of lucern will run to a great depth in the ground, from whence they muſt of courſe extract a large quantity of food: this ſpares the ſurface; and in fact the land where lucern grows requires only that the natural graſs ſhould be prevented from getting to a head, which it is in our climate very apt to do, and if let alone would ſoon choke up the lucern.

It is mentioned above, that if corn is ſown with lucern, it ſhould be only half a crop: ſome of your readers may not, perhaps, readily comprehend the meaning of this expreſſion; therefore, to render it more clear, I ſhall here obſerve, that when barley or oats are to grow with lucern, a buſhel only of either, according to Mr. Rocque's method, is to be ſown firſt on an acre, then fourteen pounds of the lucern.

One thing is to be obſerved, that if the corn, notwithſtanding its being ſown ſo thin, ſhould grow ſo rank as to endanger the lucern, it will be much beſt to mow it before the harveſt, as it is better to loſe the crop of corn than to kill the lucern.

The barley, or oats, however, need not be entirely loſt, as they may, when mown, be given green to cattle; or, if the weather is fine, will make excellent hay, provided they are properly dried; and it is beſt to do it in the ſwarth, as the rich juices are in that manner leſs exhauſted. To ſow it later than May is dangerous, for fear of a dry ſeaſon, or its being eat up by the fly.

Lucern will not grown on freſh-broke-up land; it muſt be tilled a year or two: peaſe and beans, for one year, will prepare the ground; but, above all, potatoes excel for ſweetening and mellowing of land; the next ſeaſon a fallow for turnips, and when the turnips are fed off with ſheep, it will greatly enrich the land, which ſhould then be prepared for lucern.

In regard to the tillage, and time of ſowing the lucern-ſeed, the nature of the ſoil muſt be conſidered. Heavy ſtrong land will require more ploughings and harrowings, and to be later ſown: light land will need fewer harrowings and ploughings, and to be ſown earlier, that the young plants may have ſtrength to ſend their roots deep into the ground, before the hot dry weather comes on to hurt them; and if, for the firſt time, the land had a trench-ploughing, it would be of great advantage.

In Languedoc they ſow no corn with the lucern; and when it is ſix or ſeven inches high, they mow it; by which all the ſeeds of annual weeds are cut off and killed.

In Normandy, the climate being much the ſame as in England, they ſow corn with it.

In Picardy, and about Paris, they ſow it, ſome with, others without corn.

At Avignon, when their lucern begins to decline, they manure the ground and plough afreſh, and ſow it with corn and lucern; and the old roots, growing again with the ſeed, make another fine crop: the ploughing will not hurt the old roots.

If a full crop of barley is ſown with lucern, and the barly grows very ſtrong, the beſt way is to mow the barley when it is in the ear.

If forward peaſe are ſown on new-broke-up land to prepare it for lucern, it may be done in one year, and turnips ſown on it as ſoon as the peaſe are off: the turnips may be fit to feed off by Chriſtmas; and as ſoon as the turnips are off, the land ſhould be ploughed, and lie fallow till a proper time to ſtir it again; or it may have a trench ploughing, as before directed.

This method of giving land a trench-ploughing, to prepare it for lucern, is much to be recommended, as it ſtirs the earth almoſt as deep as if it was dug with a gar-

garden ſpade: of what advantage this muſt be to a plant that ſends its roots deep for nouriſhment, need not be mentioned, as it cannot but be obvious to every reader.

Was labour cheaper than it is in England, it would doubtleſs be much the beſt way to dig by hand all the land that was deſtined to lucern: many advantages would reſult from this method of tillage, and particularly the weeds and graſs would not be ſo apt to grow as in ploughed land.

I would heartily recommend it to ſome of the gentlemen in Ireland, to ſow with lucern ſome of their land that has borne a crop of potatoes; it could not fail ſucceeding, and they would have a fair opportunity of trying what crops this plant will, when beſt cultivated, yield.

I cannot but think, that on good land that has borne potatoes, there might be five good mowings in a year, particularly in Ireland, where the climate is rather milder than in England; and this without injuring the roots. An eaſy experiment would, however, ſoon make this matter known: I therefore heartily recommend it to the attention of your Iriſh readers; they are every day improving their lands, and will, doubtleſs, not ſuffer this hint to paſs unnoticed.

When we conſider the many advantages reſulting from the culture of this plant, it is aſtoniſhing that it ſhould ſo long eſcape our regard: the hint was given us by the Roman writers on the ſubject of agriculture, but we were too much attached to old cuſtoms to improve it.

In hot ſummers the ſeed may be ſaved in England, but not from the firſt growth; that being generally too rank, and ſubject to rot at bottom.

In Languedoc they ſave it from the third growth; but as this climate is colder, it will not have time to ripen, unleſs ſaved from the ſecond growth.

A dry ſoil is beſt to ſave the ſeed upon, as it is not ſo apt to grow rank; and then it may poſſibly do from the firſt growth.

As lucern, if the land is good, will bear ſeveral crops in one year, like clover; what Mr. Rocque means by the firſt, ſecond, and third growths, are, he ſays, the different crops it produces in one ſummer, which are three, four, and ſometimes five mowings, in caſe no ſeed is ſaved from it; if ſeed is ſaved, it muſt be from the ſecond growth: the ſeed will be ripe in September, and muſt be gathered by hand.

When the plants are one year old, it will be proper with a large harrow, to go over your land as often as is ſufficient to root up annual weeds and graſs.

The harrow will not hurt the lucern, the roots of it being very tough: this muſt be done in dry weather, before it begins to ſprout, which is very early in the ſpring, that the weeds and graſs may die; and if there are any patches of ground where the ſeed miſcarried, a little ſeed muſt be ſown and the ſpot harrowed: a dreſſing with rotten dung, at the ſame time, will repay the expences of it by a larger crop; if the harrow ſhould cut or wound any of the roots, they will ſprout and grow notwithſtanding.

The ſecond ſpring, after ſowing, it will be proper to plough the ground, where the lucern grows, with a drill-plough, with a round ſhare, without a fin or feather, and without a coulter, to prevent the roots being too much hurt. It ſhould lie rough a few days to dry and mellow; then, in fine weather, be harrowed down to mow it the cloſer.

One, not uſed to the culture of this plant, will be apt to think, that ploughing will deſtroy the lucern; but any gentleman, that will take the trouble to call at Mr. Rocque's, may be convinced that experience teaches the contrary.

To make hay of lucern, it ſhould be mowed as ſoon as the bloom appears, or rather ſooner: it muſt not be ſpread, like common graſs, but lie in the ſwarth, like clover, and turned in the ſame manner; or the leaves, which are moſt nutritive will drop off.

If ſuffered to ſtand too long before it is mowed, the ſtalks will be too hard for the cattle to eat it, and it loſes much of its goodneſs.

The hay is good for all ſorts of cattle; and when horſes are fed with it, they ſhould not have their full allowance of corn; the lucern anſwering, in a great meaſure, the purpoſe of both corn and hay.

It is alſo the moſt profitable of any ſort of fodder to feed horſes with in the ſummer, by mowing and giving it to them green.

If the land is good the produce is incredible; and according to the goodneſs and depth of the ſoil, ſo will be the crops.

Mr. Rocque ſays he has ſeen lucern mowed five times in a ſeaſon; yielding, at the five mowings, nearly eight loads of hay per acre.

The ſpring ploughing amongſt the lucern muſt be annually repeated: it kills the graſs and weeds, and makes the ground ferment, which promotes vegetation; and the oftener it is refreſhed with a little dung on the ſurface, the better it will pay for the trouble of cultivating it. If the dung is laid on before the winter, that the ſalts may be waſhed in by the rain and ſnow, and ploughed in, in the ſpring, it will greatly add to the profit.

This is the ſubſtance of Mr. Rocque's account of the culture of lucern; but as different ſorts of ſoil may require different methods of tillage, he has ſubjoined the idea of a harrow, with two handles like a plough which may ſerve in light land inſtead of the plough, and will ſave ſome labour.

The teeth muſt be ſet at ſeven or eight inches apart in the firſt row, and about five inches long without the wood. The ſecond row muſt be placed nine or ten inches behind the firſt, and ſo that the teeth of the ſecond row may be againſt the ſpaces of the firſt row; and they muſt be an inch longer than thoſe in the firſt row, ſo that the ground, being looſened a little by the firſt row, the teeth of the ſecond row may go ſomething deeper; and the teeth of the third and laſt row muſt be an inch longer than thoſe of the ſecond, and placed ſo as that they may go in the ſame track with the teeth of the firſt row.

The harrow muſt be made of one ſolid piece, four or five inches thick, and the lower ſide muſt be rounded off towards the hinder part where the teeth are longeſt; whereby the perſon that holds it by the handles, preſſing down a little, may force the ſecond and third rows of teeth deeper than the firſt; and by bearing up a little, he may prevent any but the firſt row from working. A very little practice will be ſufficient to make any one uſe it as occaſion requires, and it will be ſo ſteady that no unevenneſs of the ground will be able to throw it out of its work, as a clod or ſtone will a common harrow.

. . . . . } The manner the teeth are to be placed in
. . . . .

Let it be remarked, that the foremoſt row of teeth are placed in a line acroſs near the middle of the block or plank; the other two rows behind that; and the fore part of the harrow ſhould be heavier than the hind part when the weight of the harrow is ſuſpended on the firſt row of teeth. The teeth ſhould be pretty ſtrong, and round; their being ſquare, as uſual, may hurt the roots a little, which is to be avoided as much as poſſible, though the conſequence would not be very great.

Farmers are fond of ſowing broad-caſt, it being no eaſy matter to make them comprehend the utility of a drill-plough on any occaſion: the ſight of ſo complicated an inſtrument, terrifies them; they think it moves by clock-work: and as to the labourers, it is a very difficult matter indeed to get them to hold it.

I am fully ſenſible, as I have already obſerved, of the good effects of ſowing corn and pulſe regularly with intervals, but cannot approve of this method when applied to artificial graſſes; and it would be well if we were to improve our old practices, before we ſhould even attempt to bring the new methods into general uſe. *Muſeum Ruſticum, vol.* I. *page* 78.

In the ſucceeding volume of the above work, another correſpondent has made the following remarks on the above method delivered by Mr. Rocque.

This gentleman, ſays our author, owns he is againſt innovations in huſbandry, becauſe it is difficult to bring the farmer from the old methods; and therefore ſeems to conclude, new ones are not to be attempted; at leaſt, that ſeems to be his reaſon for being againſt what he calls innovations.

Under "reſtrictions, &c." he approves of the new culture, but thinks it "prepoſterous to extend it to artificial graſſes;" adding, "the only benefit lucern can receive from the horſe-hoe, is, that it keeps down the natural graſs." This gentleman cannot be a practical cultivator of lucern; neither can he know the uſes of the hoe-plough; if he did, he could not aſſert a fact ſo contradictory in itſelf.

To inaccurate obſervers the ſeedling plant of lucern may appear to have no lateral roots; but a careful examiner will find a great number of ſmall ones, every one, or moſt of which are furniſhed with freſh nutriment by the operation of the hoe-plough.

We ſhall not contend about Mr. Rocque's ſuperior profit: his ſituation gives him advantages ſuperior to a diſtant reſidence; and therefore that ſhould not be mentioned by a generous writer.

I am a favourer and practiſer of the New Huſbandry, and I do deny that it will be more expenſive than Mr. Rocque's method, but, on the contrary, it will eventually be cheaper.

By his method, he may, for a few years, have pretty good crops; but at length his plants will be found to dwindle, and his crops will leſſen, unleſs he annually adds ſeed to the ground; whereas, in the new culture, the crop will be continually improving; as to the quality being inferior, that will be the fault of the owner, if he lets it grow too rank. This argument of your writer makes againſt himſelf, as thereby he admits the ſuperior luxuriance of the plants cultivated by the horſe-hoe.

I have ſown lucern in broad-caſt more than once, and have ſeen others do it; and it ever failed.

Mr. Rocque's rule, as this gentleman ſays, is, "that lucern will grow on any land, if not wet:" this is certainly premature: it ſurely muſt have the occupation of a dry, rich ſoil, or I am ſure, from practice, it will not ſucceed; and as to "the ſtrongeſt being preferred," I believe every one, who tries the cultivation of it on ſuch, and upon light ground, will find the latter beſt adapted to it.

But the notion of ſowing corn with lucern is quite as "prepoſterous," I think, as the new culture for it; and how a man of Mr. Rocque's famed abilities ſhould adopt ſuch a method, I am at a loſs to gueſs. Neither ſhould lucern be ſown in March, as in its infant ſtate it is very tender and timid of froſt.

This gentleman ſays, "it is for want of knowing the nature of lucern, that they drill it." I might retort upon him; but his miſtaken zeal, I fear, will more injure the cauſe he means to promote, than I hope it will diſcourage the practice of drilling this valuable plant, as, by all men who adhere to rational principles, that hath been found the moſt ſucceſsful method. See Tull, Duhamel, &c. I ſhould be glad to know what "the ſurface of the ground is to be ſpared for;" is it to give life to the natural graſs, that common and deſtructive enemy of this excellent plant?

Our athor mentions the cultivation of it in France, &c. If he was ever at Paris, with his preſent attention, he muſt have ſeen, that after a few years they always plough up the promiſcuous ſown lucern, in order to prepare the ground again for that, or ſome other crop, when the lucern begins to dwindle by the weeds or natural graſs robbing it of its nutriment.

How much more muſt that be the fate of promiſcuous ſown lucern in theſe kingdoms, where he admits graſs is apt to get a-head? That is not the caſe in France, and yet even there promiſcuous ſown crops are ſhort-lived.

I know not whether he be as converſant with potatoe-ground in Ireland as I am; but I cannot omit to inform you the tillage will not do for lucern: for this plant the ground ought to be well pulverized: whereas, in the general potatoe tillage of this kingdom, not more than about two feet in nine of the ground is cultivated.

The manner of harrowing the lucern, practiſed by Mr. Rocque, although the teeth be round, muſt wound many of the roots: that might be well, as it would thin them; but repeated harrowing will, in time, wound them all; and notwithſtanding they will afford graſs afterwards, yet, when the winter rain comes on, lodgments of water will be made in thoſe wounds, which will bring on putrefaction, to the deſtruction of the plants, unleſs Mr. Rocque has the art of conducting the harrow-pins always in the ſame direction; and could that be the caſe, what would deſtroy the graſs where they did not paſs?

The manner of ploughing the lucern, practiſed by Mr. Rocque, is ſtill approaching to the horſe-hoe, tho' by no means ſo effectual. I wonder to ſee our author even favour that, ſince it may be deemed an "innovation." This ploughing is to be repeated every year, and harrowing alſo: to this dung is to be added, "as often as may be." I am willing to belive this gentleman knows nothing of the expence which attends theſe operations, *i. e.* ploughing, harrowing, and, above all, dunging, beſides the value of the dung, which would always be accept-

acceptable for other grounds; whereas, in the drill way of ſowing lucern, when the land is once put in good order, it may ever be kept ſo by the hoe-plough.

Lucern is a graſs of ſuch ineſtimable value, that it will anſwer almoſt any expence; yet if the moſt certain method to obtain ſucceſs ſhall be found the cheapeſt, there can be no reaſon for purſuing one more precarious and more expenſive, which will be found when Mr. Rocque's method, or at leaſt that ſo warmly recommended by your correſpondent, who aſſerts it to be Mr. Rocque's, is compared in practice with the one I venture to recommend to the practice of my countrymen, which I take upon me to ſay will command ſucceſs, if purſued.

The land ſhould be a flexible loam, dry, deep, and rich, either by nature, or made ſo by art; not but it will ſucceed to admiration ſhould a quarry be under. It ſhould be well pulverized by plough and harrow, laid as flat as poſſible, and cleared of all weeds particularly ſcutch-graſs: when the ground is in this form, let a ſmall plough, with two mould-boards, be run up and down the field, at every three foot upon the flat ſurface: this will compleatly form three foot ridges. If a pair of drill-harrows be not at hand, let the crown of every ridge be carefully raked clean and even with an iron rake, and one row of ſeed drilled very thin, about half an inch deep, along the middle of every ridge, the middle or latter end of April, (the beginning of May may do) and be carefully covered. This ſowing of the ſeed may be done by hand, if a drill-plough be not ready. By a maſter's attendance, a great deal may be done in a day.

Thus it may remain till weeds begin to appear, when the hoe-plough, or a ſmall common one, ſhould take away every alternate ſide of the ridges, as near the lucern as can be with ſafety (I go within two or three inches of my drilled crops.) In three or four days, return the mould to the former places with the plough, and then proceed to take off the other ſides of the ridges in like manner, and return it as before.

If the ground be made in good condition before ſowing, a crop may be mowed in July, the produce of which will ſurpriſe any one who is not acquainted with the plant.

In September it will be fit to cut again; but if in the intermediate time weeds ſhould appear, let the hoeing be repeated: thus the weeds will be deſtroyed the firſt year.

After the ſecond cutting, ſend in the plough again, and take off the ſides of every ridge within about ſix inches of the plants, and ſo let them remain till February, when the plough ſhould return the mould to every ridge; and in May the graſs will be ready for cutting, and will continue to afford a crop every month during the ſummer.

The hoeing ſhould be repeated, as before directed, as often as weeds appear; but obſerve never to horſe-hoe it when the ground has any adheſion.

The hoeing before the winter is to keep the plants dry during that ſeaſon, and to meliorate the ſoil of the alleys by the influence and mechanical operation of the winter froſts.

To keep my letter within reaſonable compaſs, I have been ſhort in my directions, but to practical farmers, I hope, ſufficiently plain; if not, any neceſſary explanation I ſhall chearfully furniſh.

Your readers will pleaſe to obſerve, that after the firſt preparation of the ground, if they horſe-hoe the crop regularly every year, the dung which Mr. Rocque's friend recommends (as it may be got eaſily at in London) may be ſaved for other purpoſes, as by this method of managing lucern, the crop and ground will be improving every year.

I appeal then to every impartial judge, whether this method is not cheaper than the ploughing, harrowing, and dunging, ſo warmly recommended by your correſpondent. It is almoſt unneceſſary to urge, that a crop raiſed in this way will, ever after the firſt year, be equal, if not ſuperior to Mr. Rocque's, as the gentleman admits as large crops may be raiſed in the drill way.

I am a ſtranger to Mr. Rocque and his friend. I have no other motives in troubling you on this ſubject, than a public benefit to mankind, and a gratitude to the memory of Mr. Tull, whoſe ſuperior ingenuity, I bluſh to own it, hath ſhone in France, to the reproach of Engliſhmen. And were we all to join in opinion with your correſpondent (who ſays, "It would be well were we to improve our old practices, before we even attempt to bring the new ones into general uſe,") we ſhould indiſcriminately merit the pity of all nations for our perverſeneſs. Perhaps, had Tull been a foreigner, his ſyſtem would have been eſtabliſhed amongſt us long ago.

The author of the former account not being ſatisfied with the reaſons offered by his antagoniſt, made the following reply; which we thought neceſſary to inſert, that our readers may judge for themſelves, and follow the method that ſhall appear to them the moſt rational.

I troubled you the beginning of laſt year with a letter on the ſubject of lucern, which you were ſo obliging as to inſert in your firſt volume, page 339.

I am ſtill an advocate for Mr. Rocque's method of culture in preference to Mr. Miller's as far as regards this plant; and that for this plain reaſon, becauſe I imagine the farmer will be much more likely to adopt the firſt than the laſt: and the culture of lucern can produce very little advantage to the nation, unleſs it is generally adopted by the common farmers.

My reaſon for troubling you, or your readers, at this time, is to remind you, that Mr. Rocque's ſmall tract, lately publiſhed, contains ſome particulars reſpecting lucern, which were not noticed in my former letter, and therefore may, with great propriety, be now laid before your readers.

The firſt of theſe particulars relates to the manner of ſowing the lucern; and in this Mr. Rocque differs widely from Mr. Miller, as he thinks it ſhould not be ſown without corn; but I will give you Mr. Rocque's own words, as they carry great weight with them. "You muſt not ſow lucern without corn, unleſs your ſpot of land is too ſmall to uſe a harrow in: in that caſe, you muſt ſow it in drills, and keep it very clean hoed. The drills for ſuch ſmall ſpots are to be ten inches diſtant; if wider, it lodges in the drills. The reaſon I recommend ſowing corn with it is, to prevent the weeds choaking it; but, you muſt ſow only for half a crop; otherwiſe your corn will be apt to deſtroy your lucern, eſpecially if it proves a wet ſeaſon, and your corn is ſtrong. If there is no corn ſown amongſt it, you muſt be obliged to mow the weeds, and run a chance of cutting the lucern with them: and, being very ſappy, you cannot imagine how detrimental it is to bleed it when young; but when the corn will be fit to mow, the lucern alſo may ſafely be cut."

As the duration of lucern has been a queſtion long agitated, and not, that I know of, finally determined, it

will not be amiſs to mention a fact related by this able cultivator, as it will be an encouragement to the planters of lucern.

"As to the duration, it will laſt as long as the ground is kept clean. I ſaw ſome at Mr. Middlemar's, at Grantham, in his garden, that was forty years old; and it was very fine. To keep it thorough clean, you muſt harrow it every time it is mowed; and, if requiſite, at Michaelmas, and in February and March. If you once leave it foul, it will be very expenſive to clean. You muſt make uſe of the drill-plough: but let the harrow be ever ſo ſtrong, you need not fear its hurting it."

In my letter to you, above-mentioned, it is obſerved, that in preparing land for lucern, a trench-ploughing would be of great advantage: but in the piece lately publiſhed, Mr. Rocque ſays, "In caſe you are not well acquainted with the ſtate of your ground, you muſt trench-plough it twice, according to the directions for ploughing, which are in my Hints upon Burnet; whereby the roots will run down the ſooner out of the reach of dry weather: and if the ſoil, that is turned up, be ever ſo four, future ploughings, harrowings, and manurings, will ſweeten it ſufficiently for the reception of the ſeed."

Mr. Rocque adds, in this place, that "Lucern will grow very well in clay land, with proviſo the ground works well. The difficulty in theſe lands lies in the harrowing; in dry weather the ground being ſo very hard, the harrow can do but little good, unleſs you take the ſeaſon between wet and dry to harrow it, which you certainly muſt."

It is alſo obſerved, that in the province of Languedoc, in France, the inhabitants mow their lucern when it is ſix or ſeven inches high, in order to kill the annual weeds. Of this practice Mr. Rocque now ſays, "By my own experience, I find they are in the wrong; for it bleeds it, ſo that the plants make but little progreſs when cut ſo young, and are a long time in recovering it. It ought never to be cut but when in bloom."

A great many imagine that the ſeed might profitably be ſaved in England; but Mr. Rocque is of a different opinion, and indeed I am inclined to join with him in this reſpect, as in this iſland it is at beſt but a precarious crop, and can be imported ſo cheap, that the ſeedſman can afford to retail it at nine-pence per pound, at which price it was this year advertiſed. Mr. Rocque's obſervation on this point is as follows: "In hot ſummers the ſeed may be ſaved in England, but not from the firſt growth, that being generally too rank, and ſubject to rot at bottom: though I think it is needleſs attempting to ſave any of the ſeed in England; for, in the year 1761, which was a very fine ſummer, I tried to ſave the ſeed of the ſecond growth, on light land, but made nothing of it; not ſaving above thirty pounds of ſeed upon four acres and a half. I alſo tried, that ſame ſummer, to ſave ſome off ſtiff land; but that proved ſtill worſe."

I have only now to give you Mr. Rocque's thoughts on the value of this graſs, which, in my opinion, deſerves to be preferred to almoſt all others.

This practical cultivator ſays, "I have already obſerved, it ought not to be cut but when it is in bloſſom; and that is but three times a year: but after mowing the third crop, you may, inſtead of mowing the fourth, feed it: but when froſts come, you muſt take your cattle off; becauſe there are always young ſhoots, which would be bruiſed, if the cattle were not taken off. If it is rank in September, it is dangerous for cows, being too feeding; but turn horſes and ſheep upon it. As there is no graſs, as has yet come to our knowledge, which gives the cows ſo much milk, you may let them graze about an hour, at moſt, in the afternoon, when the dew is off. When made hay, it is likewiſe the beſt for milk: wherever it is much cultivated, they prefer it to all other kind of hay.

When I was at Monoſque, a city in Provence, which was about twenty-ſeven years ago, the carriers fed their horſes upon it, preferably to any other, without corn; and the mules looked fat and in fine order. Six mules which I hired there, to carry my ſeeds at Nimes, fed on nothing elſe, and yet carried their load all day long, without unloading. They have the cuſtom of hanging little bags to their horſes or mules heads, wherein they put lucern, on which they feed as they go.

It is acknowledged by all connoiſſeurs to be the moſt feeding of all paſture, either green or in hay. I truſt not barely to report, but have experienced it to be ſo myſelf. I had colonel Vernon's horſe ſent to me from the country, in a very poor condition; and, in fourteen days, he was in very good order. The colonel was ſurprized to ſee how he had throve in that ſhort ſpace of time.

Many are apt to condemn it, but it is for want of knowing its good qualities. It has been introduced for a long ſeries of years; but ſo little noticed, that one and twenty years ago there was not two hundred weight of lucern graſs ſeeds to be ſold amongſt all the ſeedſmen here in London; and I had much ado to re-introduce it; but now, within theſe three or four years, there is a prodigious conſumption of it.

One Mr. Beadle, a farmer in Kent, has fourteen acres of it, for which he had a premium. When I called upon him, which was in the beginning of May laſt, he had mowed his lucern, and ſold it upon the ſpot, for three pounds or three guineas a load. I blamed him for cutting it ſo young; but he told me he was compelled to it, to get fodder for eight hundred head of ſheep, that he had; but that, a little while after, it grew ſo faſt, that he could turn his ſheep upon it. Thoſe that bought his hay muſt needs be well acquainted with the goodneſs of it, to fetch it on the ſpot, though they were ten or twelve miles diſtant.

It is not foggy, like clover or tares. Horſes will work with it green, as well as with hay or corn: they do not ſweat with it, as they do with other green fodder. I have been told, one of our poſt-maſters kept his horſes both winter and ſummer with it, and that his horſes were the beſt on the road. They object, the hay of it is difficult to make: it is no more difficult than clover. All hay is difficult to make in wet weather: but when it is a bad ſeaſon to make hay, do as Mr. Allen does; put it up in ricks when dry, and between every bed of hay, of any kind, put a layer of ſalt, and that will recover all the damage the rain can have done.

I have done it myſelf, this very laſt year, with a rick of burnet: to about twelve loads I have put a ſack of ſalt among it; and every time my horſe comes near it, he eats it very eagerly, though he can get but at the outſide of it. It will keep in ricks as long as any hay.

Multitudes, at preſent, are pretty well acquinted with the excellence of both theſe graſſes: but if any doubt the truth of what I aſſert, let them take the trouble to enquire into it, of Mr. Shennelly, the tobacconiſt, at Houndſditch;

ditch; to whom I have ſent a load of lucern, and am to ſend another load of the ſame, and half a load of burnet hay.

Thoſe who are not ſatisfied with the theory, may be convinced of the practical part, by ſeeing a field of mine of lucern, of four acres and a half, at Batterſea, and the manner of working the harrow."

From what has been ſaid on the ſubject of lucern, I hope your farming readers will be induced to adopt the culture of it; as, if they are not blind to their intereſts, they cannot but be convinced of the many advantages which would reſult to them from ſo doing. Mr. Rocque's method of cultivating this plant differs but little from the manner in which they raiſe clover; and the profit to the landholder will be abundantly greater. *Muſeum Ruſticum, vol. iv. p. 259.*

The following method of cultivating lucern, is extracted from a very ingenious performance, entitled, *Eſſays on Huſbandry*, the principal intention of which is to recommend a newly diſcovered method of cultivating this plant.

Mr. Rocque, as may be ſeen above, has adopted the old Roman method of ſowing it, broad-caſt, and harrowing the land from time to time by way of deſtroying the weeds. Mr. Miller recommends the new, or drill, huſbandry for the culture of lucern; but the author of the Eſſays above-mentioned differs from both theſe practical cultivators, and raiſes his lucern in a nurſery; after which he removes the young plants, and having cut off their ſtalks and tap roots, tranſplants them, with great regularity, into the field where they are to ſtand for a crop.

I ſhall not pretend to decide which is the beſt method; yet I may venture to ſay, that I know it may be raiſed to conſiderable profit, both in Mr. Rocque's way, and according to the rules laid down in the new, or horſe-hoing, huſbandry.

I have no doubt but it may ſucceed by tranſplantation; yet I greatly fear that the expences in this method will, when applied to any conſiderable extent of land, greatly exceed the worth of the crop.

Theſe Eſſays being too learned for the honeſt farmer's reading, it is very improbable they ſhould ever fall into his hands; yet, as it is a great pity he ſhould not be permitted to judge for himſelf in a matter which may turn out ſo much to his advantage, we have taken the trouble of tranſcribing a few pages of the ſecond Eſſay, which more immediately treats of the culture of lucern by this new method of tranſplanting.

In this extract we have omitted all reaſonings that might render the narration obſcure to the farmer; not that we had ourſelves any objection to them, or did not approve of them, but that we were willing the honeſt cultivator ſhould have as much of this matter laid before his view, in a plain manner, as was neceſſary for him to underſtand it: when this is done, he may judge for himſelf; and if on trial he finds the method here recommended anſwer, his beſt way will be to adopt it in his future practice.

Whoever propoſes to ſow a lucern-nurſery, or engages in any larger undertaking of cultivating whole fields of ſainfoin, trefoil, buck-wheat, ſpurrey, fenugreek, ſweet melilot, &c. would be no ways ill-adviſed, if he prepared a bit of ground, and ſowed a ſpoonful of the ſeeds about a fortnight before he propoſed to ſow his larger quantity; ſince, from the good or bad ſucceſs of this little attempt, he may be enabled to judge, whether the ſeedſman has ſupplied him with ſeeds fit for vegetation. Without ſuch precaution, a whole year may be loſt; which is a mortifying circumſtance in matters of huſbandry.

In the end of March, 1757, a common day-labourer was ordered to ſow a pound and a half of lucern ſeed, and keep the ground clear from weeds. The ſeed was ſown on one of the leaſt promiſing pieces of land in all the neighbourhood; but this was done by expreſs order; for it was thought unfair to make the experiment on a better ſoil than the commoneſt ſort of graſs-fields. The ſpot of earth ſet apart for the purpoſes, both of nurſery and tranſplantation, was, in former times, a kitchen-garden: but the good ſoil, to the depth of eighteen inches, had been removed for the ſake of manuring a corn-field. [To which we ſhall juſt add, that the attempt was made in an hilly country, where the ſtaple earth is naturally ſhallow.] What remained was a cold, yellow, clammy ſtratum, which the country people looked upon as mere clay; but, its nature having ſince been better examined, it appears to be a mixture of imperfect clay, and imperfect marle. No manure worth mention was uſed upon it, as will appear by the ſequel.

To all ſeeming appearance, little, or next to nothing, could be expected from a piece of ground of ſuch an unpromiſing caſt; but, upon the whole, the experiment proved ſucceſsful and eaſy.

By the middle of Auguſt, the plants were, ſome of them, eighteen inches high; and many of them branched out, ſubdivided themſelves, and made very fine ſide-ſhoots: upon which it was reſolved to venture upon the ſecond part of the experiment, according to the accounts given by M. de Chateauvieux; therefore taking the advantage of a moiſt ſeaſon, in the beginning of September, (which ſeaſon, by the way, did not laſt long) we performed the work in the following manner. But here let it be juſt obſerved, in paſſing along, that the time of the year, pitched upon for tranſplanting, was, at leaſt, three weeks too late for England, though, perhaps, highly proper for the territory of Geneva, or the ſouthern parts of France. This therefore is ſet down as one of the *mutatis mutandis* ſo indiſpenſibly neceſſary in matters of agriculture, when the practice of one country is copied in another.

Firſt the roots were dug up carefully; orders being given before-hand not to attempt drawing them, even with the ſmalleſt degree of violence, till the earth was entirely looſened at top and at bottom. In the next place, the long tap-roots were cut off eight, nine, or ten inches, diſcretionally, below the crown of the plant (the ſciſſars being generally applied juſt beneath the forks of the root, if it be a branching root:) then the ſtalks were clipped about five inches above the crown of the plant; and the remaining plant, after theſe amputations (which may appear, at firſt ſight, to be very bold ones) was thrown into a lage veſſel of water which ſtood by for that purpoſe, in the ſhade. Such refreſhment is no ways unneceſſary; for this plant is very impatient of heat and ſun-ſhine after it is taken up; nay, to ſuch a degree, (at leaſt the firſt half year of its growth) that one may almoſt call it a ſenſitive plant. The ſame day, making uſe of a dibble, or ſetting-ſtick, and filling every hole with water before the roots are put in, we tranſplanted them in rows, two feet aſunder, and each plant ſix inches apart in the rows; having firſt made little drills, or channels, and ſprinkled, or half filled, them with ſea-ſand and wood-aſhes kept dry (two parts of the former to one of the latter;) which was done

done with a view of looſening the ſoil, and giving a little warmth to a piece of ground which was naturally cold and clayey; nor was any other manure uſed. The drills were afterwards once watered, to take off the dryneſs and heat of the aſhes. The roots were placed firmly in the ground, and two inches of the ſtalks covered with mould.

Yet here it muſt be freely acknowledged, that the hopes of poſſeſſing a large crop occaſioned one miſtake, which we choſe rather to mention than ſuppreſs, as many people may happen to entertain the ſame falſe expectances. The miſtake was that we made our rows two feet aſunder, which was over narrow; and placed the plants, in the lines, only ſix inches apart, which brought them nearer together than they ought to have ſtood, even though the ground was very poor: nor did we foreſee, that horſe-hoe ploughing is five times more efficacious, as well as cheaper, than hand-hoeings.

Therefore, after frequent experiments, ſince made, it appears beſt to make the lines three feet four inches diſtant from each other: and if the ſoil be good, it may not be amiſs to allow each plant a foot diſtance one from another in the lines, for thus the hand-hoers will work more commodiouſly, and a little hough-plough may be guided ſafely up and down the intervals, which will ſave a great deal of trouble; nor will the future crops be leſſened, by ſuch thin tranſplanting, half ſo much as may be imagined; but, on the contray, the plants will be larger, more juicy and better taſted; which circumſtance may be extended in favour of the New Huſbandry in general. Space and culture improve the herbage and ſeeds of plants; in proof whereof I have been aſſured, from good authority, that all the corn, raiſed by M. de Chateauvieux, ſells at an advanced price; being larger, brighter, and healthier than common corn, and, conſequently, more fit for ſowing, or making bread.

But, by way of confirming the neceſſity of allowing lucern roots a good ſhare of ſpace, a friend of the author's filled an acre with plants, according to the firſt directions; but, the ſoil proving extremely good, and free from weeds, it ſoon appeared that the roots ſtood too cloſe: in conſequence whereof, every other plant was taken up the next autumn, and, a freſh acre of land being properly prepared to receive them, he thus gained a new plantation of lucern, at a ſmall expence, with little trouble: and, what is more remarkable, it is thought the ſecond acre bore a larger quantity of herbage than the firſt would have done, if the plants had continued as they were, without being thinned, to the amount of one half. Of courſe, there is reaſon to conclude, that this ſlight hint, which took its riſe from mere accident, ought not to be looked upon as quite unuſeful, ſince two acres may be raiſed with almoſt the ſame expence as a ſingle acre.

In ten days, though a drought ſucceeded, ſome tranſplanted plants made ſhoots of three inches height; which vigorous growth gave better hopes than had been conceived at firſt.

It was alſo ſome encouragement to the undertaker, that he found wild lucern within two muſket ſhots of the place where the nurſery was formed. Theſe plants were certainly *aborigines*; for they grew in a part of the kingdom where the name of lucern had rarely been heard of, except by gentlemen. Beſides, no perſon curious in huſbandry would have ventured ſowing the ſeeds in ſuch an unpromiſing piece of ground; for the field, where the wild lucern grew, was a ſort of coarſe uncultivated moraſs, and valued only at about two ſhillings and ſixpence an acre.

Yet ſtill the approach of winter made many perſons doubtful concerning the ſucceſs of this new plantation; nevertheleſs, it was ſome ſatisfaction to recollect, that there is leſs harſh, ſevere cold in England (and that almoſt by one third) than in the territory of Geneva, where the original experiment was made, and where the plant we are ſpeaking of has been known to thrive ſo extremely well.

At length the winter paſſed over, and, out of four thouſand roots, only thirty or forty periſhed, whether by froſts, immoderate rains, or any other accident, is hard to ſay: but the labourer filled up all the vacant ſpaces from the nurſery in about an hour, and in April, 1758 moſt of the plants were nearly equal in ſize and ſtrength; of a deep juicy verdure, with few or no diſcoloured ſickly leaves: but, May the eighth, people counted ſixty ſtems from one particular root, and the ſtalks and leaves of ſome choſen plants weighed near half a pound at one cutting. Yet we learn, by experience, that lucern muſt only be conſidered as in a progreſſive ſtate, till the third ſummer after tranſplanting; and then M. du Hamel aſſures us, that one flouriſhing plant will produce a pound of well-dried hay; which is ſaying a great deal, and much more than I could ever verify; for if a ſingle plant produces one pound of hay, it muſt have weighed four pounds when it was green. Yet I have received an account from an eminent phyſician in our own country, (who planted two acres of lucern by my directions) that many of his plants, in the ſecond year, yielded near half a pound of hay each plant.

As an acre of lucern, thus managed, will contain more roots than one is apt to imagine at firſt gueſs, how great muſt the produce be of four or five cuttings every year, and thoſe confeſſedly the moſt nouriſhing and palatable food that cattle can eat! For thus much is certain, amongſt other advantages, that, if a field be induſtriouſly hoed, ploughed in the intervals and ſpaces, and hand-weeded in the rows, for the firſt two or three years, it is almoſt ſure, that horſes, cows, or ſheep, will hardly find a ſingle weed in a large quantity of green food.

We will now mention the ſtate of our tranſplanted lucern in its ſecond year, namely, 1758.

And here let it be remembred, that what cultivators call a proper time for cutting is, when the plants are about fifteen or ſixteen inches high, at an average, throughout the field: but this muſt be underſtood in a relative ſenſe, for ſome plants will be two or three feet high, and others may not be above ten inches, or one foot, in height, according to the circumſtances of health, ſpace, ſituation, &c. of the ſeveral roots.

The cuttings of the year 1758 were as follows: May 8th, June 7th, July 12th, Auguſt 20th, and October 1ſt.

In the year 1759, it was cut five times, and ſix times in 1760; which made ſixteen cuttings in three years. Nay by the ninth of April, in 1760, ſome of the lucern plants were near ſeventeen inches high, at a time when no field in the neighbourhood had graſs of four inches height, though you took five or ſix acres together. The ſame lucern was cut twice, before any hay-making began in the country round it, if we except ſome few meadows lying near market-towns.

Having carried on my firſt experiment thus far, upon almoſt as unpromiſing a piece of land as could be found, and being ſenſible I had made ſome miſtakes from want of experience,

experience (having as yet never ſeen any tranſplanted lucern in England) I gave directions for making a ſmall plantation in Berkſhire, but ſtill took care to chooſe a field that could hardly be called middling land. It was overrun with coarſe weeds, had been long out of tillage, and the earth in moſt places, was hardly four inches above a bed of chalk; which (let farmers ſay what they pleaſe of it, in reſpect to ſainfoin) is no ways favourable to the growth of lucern, eſpecially if the latter be tranſplanted; for the chalk flakes, when thaws and rains come on; and it either heaves the plants out of the ground, or expoſes the fibres of the roots too much to the cold. Yet upon this I ventured with my eyes open; for Pliny (whoſe authority I ſcruple not to take, when I have no other) had given me a caution concerning lucern raiſed upon chalky lands: but what induced me to make the attempt was, that the goodneſs of the ſoil might not lead me to ſay more concerning the ſucceſs of an experiment than other people may hope to find.

The little field, or cloſe, conſiſted of one rood of ground, or a quarter of an acre; which we threw into fifty-four rows, each row containing one hundred and ten plants, or five thouſand nine hundred and forty in the whole. In the ſecond year after tranſplanting, (and lucern is not then arrived to its due ſize) and at the firſt annual cutting, (which is not the beſt cutting, as the herbage ſuffers much from the winter) I weighed, out of curioſity, a parcel of the prime plants, which one with another, weighed about one pound and a quarter each. But ſuppoſing that every plant weighed only one quarter of a pound, and admitting we give up the ſixth cutting, (which is more than one needs to do) then the crop of forty perches, or one fourth of an acre, amounts to a very conſiderable return of ten tons, at leaſt, of green lucern per acre.

An acre of tranſplanted lucern, rightly managed, will bring in five pounds a year, free and clear from all expences, and that for a conſiderable tract of time. Now certainly this advantage deſerves well to be conſidered; for the huſbandman is ſaid to be a good manager who makes three rents each year; a firſt for the landlord, a ſecond for labour, &c. and a third for himſelf: but an acre of lucern will for ſeveral years produce five rents, clear of all out-goings for rates, rent, workmen, manure, &c. ſuppoſing the land to be let at fifteen ſhillings an acre, as uſually happens in moſt eſtates that lie at ſome diſtance from cities and market towns. On the contrary, if land be dearer near rich populous places, the ground will be better, and the produce more advantageous. This gives lucern its value near towns and cities, where two or three acres may be rented, but ten or twenty cannot; and ſure it is ſome advantage in huſbandry to make one acre ſupply the place of two or three, and eſpecially where it is difficult to rent land, even at a very high price.

It is certain, that the profits ariſing from tranſplanted lucern have been no ways exaggerated in my account; for by ſome collateral obſervations, it may be eaſy to carry the value of an acre ſomething higher than has been here repreſented. Suppoſe green vetches (which are rarely cut more than once) and green lucern to be of equal value as food for horſes (which is making a ſuppoſition no good writer in Huſbandry will allow to the diſadvantage of lucern;) now a perch of green vetches (if the crop be good) ſells for ſixpence at ſeventy miles diſtance from London, and a perch of tranſplanted lucern will weigh as much, or very nearly as much, at two cuttings, out of the four or five annual cuttings; which (every circumſtance being duly conſidered) brings an acre of lucern (to ſay the leaſt of its advantages in huſbandry) to be of equal value with two acres and a half of vetches; not to mention that lucern is a perennial plant, and vetches are annual; which, upon the whole, makes a new difference in point of profit.

As I think it unfair to ſuppreſs any unſucceſsful circumſtances in matters of huſbandry, I will here ingenuouſly confeſs, that the moſt material of my miſtakes were theſe: I followed my foreign inſtructions (which, at that time, were but few) with too much diffidence, and in too literal a manner. I was not enabled, through want of experience, to adapt the huſbandry practices of other nations to the Engliſh climate. I tranſplanted too late, filled my rows too full, and allowed not ſufficient ſpace for the intervals. By following the French directions over cloſely, I cut the tap roots too ſhort in the beſt plants, and knew not (as it is a point unmentioned by any cultivator of lucern) how to manage a root that was very ſmall. The means of avoiding and rectifying all which miſtakes and difficulties are, by the help of ſubſequent experience, carefully pointed out.

And here it may be worth conſidering how to apply a field of lucern, carefully and induſtriouſly cultivated, to the greateſt advantage. In ſuch a caſe, let us ſuppoſe the plantation to conſiſt of two acres, and that four large horſes are to be ſupplied with green fodder, from the end of April till Michaelmas. Now, in order to manage this affair with dexterity, count the number of rows or lines in the lucern field, and place in one of the head-lands thirty land-marks, at equal diſtances; and thus, having cut a proper portion, day by day, you will be ready to begin afreſh, after the laſt cutting.

When I ſay you will be ready to begin afreſh at the end of thirty days, I muſt deſire to be underſtood, with a ſmall degree of latitude: for phyſical accidents are ſo numerous and unavoidable in regard to the growth of plants, (tho' lucern is liable to fewer checks and miſcarriages than moſt other cultivated field vegetables) yet ſtill the nature of the thing will not allow us to predict the time of each and every periodical cutting with much certainty; nevertheleſs, thus much may be depended upon, even for ſome years ſucceſſively, that, after the firſt annual cutting, our directions, here given, will be attended with no inconvenience to the owner; for there will rarely be more than three or four days difference between the times of the ſecond, third, and fourth cuttings: nor will the want of lucern fodder, during ſuch ſhort intervals, be of the leaſt ill conſequence; for, ſurely, that huſbandman muſt be a very improvident manager who has not other graſs fields by way of a momentary ſupply.

The times, therefore, of the ſecond, third, and fourth annual cuttings, are tolerably certain; but the firſt cutting, according to the nature of the winter, may be accelerated, or retarded, a fortnight, three weeks, and, perhaps, a month.

The time of the fifth cutting is alſo, in ſome degree, variable and uncertain, as the ſolar heat decreaſes, and the days grow ſhorter. A ſixth cutting, which is ſeldom of much conſequence, chiefly depends on a fortunate ſeaſon, in conjunction with the induſtrious good management of the cultivator.

From

From this ſucceſſion of freſh green food appears one ſingular advantage in raiſing lucern: and in the next place care muſt be taken, that your plantation be always proportionable to your number of cattle; or, in other words, let it be a rule with you to have rather over much lucern, than too little; for then one cutting may be ſet apart for hay, which may be given occaſionally to favourite horſes and ſick cattle. But, in caſe no hay is made, the owner of the ground, even then, by means of the ſupplies he derives from green lucern, will be enabled to ſpare a large quantity of other graſs for hay-making; and thus two acres of lucern will give him the power of ſaving two or three tons of hay more than he could have ſaved otherwiſe; conſequently lucern, in effect, helps to keep cattle both in winter and ſummer.

By ſuch ſort of huſbandry, and provident management, the ſtock of hay for winter will be conſiderably increaſed, and the owner enabled, for the ſpace of five months at leaſt in the other parts of the year, to allow his horſes very nearly the ſame quantities of green food each day; all equally freſh, wholeſome, and well taſted: which ſingle circumſtance, (if it related to horſes only) gives lucern the preference over all other ſorts of green fodder hitherto known, and in proceſs of time may be applied (as has been experienced with much ſucceſs) to the fatting of horned cattle, provided ſuch cautions are uſed as ſhall be ſpecified hereafter, and which ought always to be remembered. Now whatever increaſes the number of cattle, augments the quantity of dung neceſſary for carrying on the more ſucceſsful cultivation of arable lands; and whatever, by multiplying the number of cattle, affords more animal food to man, will of courſe contribute towards leſſening the price of meat, which will aſſiſt ſociety in general, and more particularly the manufacturer and peaſant; for the grand ſecret of well managing a trading populous country is to ſupply the inhabitants with fleſh and corn upon eaſy terms; for then mankind will multiply of courſe (ſuppoſing the government to be mild and equal;) nor will other nations underſell us in the commodities we export to foreign markets.

Now lucern, in matters of huſbandry, comes the neareſt of any article yet known, towards attaining the points here propoſed; foraſmuch as one acre of land, thus cultivated, will ſupport as many cattle in ſpring, ſummer, and a part of autumn, as four acres of common, natural, upland graſs did before. But this uſe of lucern is greater, if land be ſcarce; or if the nation be populous, and the ſoil has been cultivated to the extent of the old huſbandry: for then the introducing this plant is, in effect, the ſame as creating new land, if the ſuperior produce of lucern, both in quantity and quality, be fairly conſidered by us.

Yet one thing muſt he well underſtood in the new practice of raiſing lucern. Negligent huſbandmen, and ſuch as expect good crops without labour, expence, frequent ploughings, weedings, &c. would act a wiſe part in not attempting to cultivate the plant here mentioned: nor is it adviſable for gentlemen of fortune to commit this part of huſbandry to bailiffs and ſervants, who (be their maſters advantage ever ſo great) will not like the labour (though they were well paid for it) of turning fields into a ſort of gardens, and, beſides all this, may conceive a prejudice againſt improvements, and take ſome ſmall delight to ſee them miſcarry: ſo that all random, careleſs, and inſincere methods of culture muſt have nothing to do with raiſing plants, which, though hardy and long-lived after they attain a certain age, yet are ſurpriſingly delicate and tender when they are young, or when firſt tranſplanted; and more eſpecially if wild couch graſs and other weeds ſhould ſpring up amongſt them.

For theſe reaſons, at firſt ſetting out, I muſt adviſe every good cultivator to be particularly induſtrious in the extirpation of weeds, and that he over-burdens not the ſtrength of the earth from a principle of avarice, but allows her the juſt refreſhments of manures, and gives her at leaſt ſome breathing ſpace of eaſe and repoſe.

It is highly unreaſonable to expect ſucceſs in the management of this plant without care, and highly improbable (if the ſeeds are good) to miſcarry with due care. It is true, many people have failed in the proceſs of this experiment; but then one is generally enabled to point out the error, as likewiſe the cauſe of ill ſucceſs, with tolerable exactneſs. To begin well in cultivating this plant is doing but little; rules and directions muſt be cautiouſly obſerved for three, or two years at leaſt. Few people make miſtakes in the beginning of an experiment: but, generally ſpeaking, after three or four months are expired, the maſter's attention and keenneſs wear off, and the bailiff or gardener, (as ſometimes the raiſing of a lucern nurſery falls in the province of the latter) are extremely glad not to refreſh his memory: for the one does not like an additional trouble out of his department, (a punctilio which has great weight with all ſervants;) and it is a maxim with the other, never to admit any thing new in matters of huſbandry, but admire thoſe ſorts of crops which Columella deſcribes, crops that can hold up their heads, and proſper under all the negligence of a pretending cultivator.

It is true, many difficulties and diſcouragements attend making experiments. The continuance of life is as ſhort as that of art is permanent; and few huſbandry experiments can be made oftener than once in a year: nor muſt we reaſon too much by analogy, from ſucceſs in one production, to ſucceſs in another of a different ſpecies. Attention alſo is required, and that even to the minuteſt circumſtances: and again, too many experiments die with the obſerver; which, though highly uſeful, did not appear conſiderable enough for human vanity to eſtabliſh a ſyſtem thereon.

Yet ſtill all theſe difficulties and diſcouragements may be counter-balanced by the advantages which reſult afterwards to ſociety.

Lucern cannot eaſily be freed from manifeſt diſadvantages by any other method of culture than what is here recommended. That it has uſually miſcarried, when ſown with ſpring corn, after repeated trials in this kingdom, from the year 1577 to 1764, is well known to many readers; for common wild graſs, and particularly couch-graſs, may be called its deſtruction, if not its poiſon, principally indeed by ſtarving the roots of it, but probably from its effluvia too. This likewiſe I have always obſerved in plants of a different ſpecies that ſtand too near each other; they immediately, as it were by a declaration of war, contend for maſtery: the roots are conſtantly attempting depredations and encroachments upon each other; whilſt the ſtalks, eſpecially thoſe of weeds, make the ſame efforts in longitudinal ſhoots; and that plant which over-tops the other, provided the ſhoots are equally thick and ſtrong, always gains the victory, and, by overſhading and dripping upon its antagoniſt, forces it to dwindle

dwindle away and periſh. This ſtruggling for life an maſtery draws up the plants too weak and ſpindling, and the conquered plant uſually dies. Now weeds, generally ſpeaking, are more hardy, ſavage, and hungry, than manured vegetables. If ſuch be the caſe, where is there a country to be found that abounds with foul graſs and weeds more than England? So that, if lucern be ſown in the uſual way amongſt corn, like ray-graſs, clover, and hop-trefoil, no care can keep an acre clean. It may laſt two years, (only one crop being tolerable) and then muſt periſh in the common courſe of nature. A gentleman very lately made this experiment (in good meaſure againſt his judgment) for the ſake of farmers, in hopes of finding out a cheap, eaſy, and compendious method of raiſing lucern; but the crop at the end of fifteen months, was as near being overpowered and ſtarved as can be imagined; which made him venture to take up and tranſplant the few good roots that remained, which, being freed from the bad neighbourhood and incumbrance of coarſe graſs and other weeds, appeared to proſper very well. Again, if lucern be raiſed in drills, according to the beſt directions hitherto given by our ingenious countrymen, Tull and Miller, (who, to do them juſtice, were the firſt perſons, amongſt our modern writers, that ſaw the great advantage of this graſs, and preſſed the culture of it ſtrongly on the Engliſh nation) certain it is, that ſuch a method will greatly exceed the promiſcuous ſowing of lucern with ſpring-corn. Yet ſtill, in the practice of drilling, a conſiderable part of the ſeeds may be faulty, and then the rows will appear naked and unſupplied with herbage: nor can the hopper be ſuppoſed always to drop the little grains at preciſe diſtances plant from plant. Nevertheleſs, ſuch perſons as prefer drilling may fill up all the vacant ſpaces with tranſplanted roots.

In the method of cultivating lucern, which is here recommended, an acre will be found to contain about ſuch a number of choſen healthy roots as the ground is capable of ſupporting, and admit a greater number of them than the reader will be apt to imagine, *prima facie*; for it will hold, according to my firſt experiment, about twenty-ſix thouſand plants: but, if the ground be clean, rich, and well conditioned, it may be more adviſable to obſerve the greater diſtances already mentioned; upon which principle, the acre will contain about thirteen thouſand plants; and this is the number, all things conſidered, I am moſt inclined to recommend; for the produce of ſuch an acre will be full as large and profitable as the former, and the ground will be managed with leſs expence and more convenience.

It may be obſerved farther, that, in tranſplanting lucern, there will be one advantage (and that no ſmall one) which can never be obtained in drilling, or promiſcuous ſowing; each root will ſtand at a proper diſtance from its neighbour, and receive its allowance of food in due quantity without diminution. In the next place, you will ſeldom ſee a plant wanting, and rarely (except by miſtake) a plant ſupernumerary: but, if a few ſets ſhould chance to die, it will be eaſy to ſupply the vacant ſpaces from the nurſery, and that as people find by experience, in any moiſt day, from April till the middle of September.

There is another advantage which ariſes from tranſplanting lucern; for, by cutting the tap-root, you prevent its penetrating ten or twelve feet perpendicular into the ground, which the plant naturally does in three or four years, except it be obſtructed by a ſtratum of rock, or chilled at root by weeping ſprings, or finds admiſſion in a bed of cold watry clay. Then the crop makes a poor appearance, or, perhaps, goes off all at once.

People who hand-hoe or horſe-hoe lucern, need not give themſelves much pains about breaking or cutting off a lateral root accidentally, not but that ſome care and caution muſt always be uſed; however, what ſeems to injure the parent-plant proves, in the end, no-ways diſadvantageous to it: for horizontal, or ſide roots, thus cut, or broken, puſh forth new roots and filaments laterally; and thus the ſuckers, or tubes that ſuck nouriſhment, are multiplied by a cauſe which had the appearance of leſſening their number. Yet tranſplanted lucern will no ways bear ſuch rude treatment as the ancients ſometimes gave to untranſplanted lucern, when they thought fit to make it undergo the diſcipline of harrowing.

How long lucern may laſt cannot be known by the experiments which are here related, namely, from the ſpring of 1757 to the beginning of the year 1764; but ſome perſons of credit have obſerved the plant to continue in good ſtrength and health near twenty years. [I ſuppoſe they mean here and there particular plants, and not a whole plantation.] Tull, indeed, tells us that, except lucern be choaked or ſtarved by graſs and weeds, he hardly knew when to ſay it will die a natural death; and probably it may not prove the leſs long lived for being tranſplanted; ſince hand-hoeings, horſe-hoeings, and digging will give new ſtrength and health to the plants. The ſpreading of the roots will be facilitated by looſening the ſoil, and letting in the good influences of the atmoſphere; their growth alſo will be augmented by giving them that additional nouriſhment of which the weeds defrauded them: and, in the laſt place, all manures will more eaſily reach them; for thus much is a certain fact in huſbandry, that, when the ground is rendered clean, light, and penetrable, the roots love to expand themſelves, in order to procure a greater quantity of nouriſhment.

I fairly acknowledge that I am not enabled, from my own experience, to fix the common duration of lucern, whether tranſplanted or drilled; (and that from no difficulty in the thing itſelf, but becauſe a ſufficient number of years has not elapſed ſince making my experiments) but thus much I can take upon me to ſay, from my own knowledge, that lucern ſown at random, or by what we call promiſcuous ſowing, as the ploughman ſows rye-graſs and clover, (whether with or without ſpring corn) will not laſt to any tolerable purpoſe above two years, or three at moſt. But as this plant is of the greateſt uſe and value, where land is dear and ſcarce, as near cities and towns, I ſee no reaſon to doubt, but that the ſame ſpot of ground may be continued as a lucern plantation for half a century at leaſt; for if the rows are three feet four inches wide, (which I look upon to be a *ſine qua non*) then, whenever the old lucern decays, new lines may be planted in the middle of each interval, which has lain fallow, and alſo been manured and pulverized for a conſiderable number of years; and thus progreſſively, *vice verſa*, to a long continuance.

Not being able therefore to give poſitive ſatisfaction concerning the continuance of lucern rightly managed, I ſhall propoſe ſomething that is not merely a query, and which, perhaps, may give the reader an equivalent information. In a few words, it is as follows: when lucern is grown old and the owner propoſes to break up the plantation, layers might be made from all the principal

ſtalks, and removed into freſh ground. Theſe layers, in all probability, may ſucceed extremely well, according to ſome few experiments made abroad in the years 1755 and 1756.

As to the expence and riſque of cultivating ſmall quantities of ground, agreeably to the method here laid down, it is to be hoped that curious gentlemen will not be deterred by ſome few minute difficulties or objections, but give the preſent experiment fair, patient, and repeated trials; for neither the out-goings nor the hazard will be very conſiderable. But at preſent it is no-ways our intention to perſuade farmers (at leaſt ſuch as are in low circumſtances) to quit their little certainty for an advantage which may appear to them quite uncertain.

Let them wait, at leaſt for a few years, in hopes ſome cheaper and more compendious method may be diſcovered for their ſakes; and if, at preſent, they make any experiments, let them be in ſmall.

The firſt point of conſideration, when I undertook to recommend tranſplanted lucern to the public, from my own experiments, was to bear conſtantly in mind whether the profit counterbalanced the expences and labour of culture, and that in a double or even treble proportion; ſince, otherwiſe, I was doing little more than poſtponing utility, for the ſake of introducing a new ſort of huſbandry, which only deſerved to be called ingenious.

We all know that the farmer expends much money, and gains very little from a crop of wheat at the expiration of his twelve months; but if we take ten years together, and compare the profits of lucern on the one hand, and wheat, barley, oats, and clover, on the other, the balance will certainly turn in favour of the lucern-crops, and that in a proportion of three, or two, to one, at leaſt.

The expence of raiſing an acre of lucern in the manner which we recommend, (and ſuppoſing even digging to be made uſe of inſtead of ploughing) amounts, as nearly as I can remember, to the following ſums:

	l.	s.	d.
Fine-digging and picking thirty perches for a nurſery	0	12	0
Seed	0	7	0
Hand-weeding the nurſery twice, and tranſplanting into vacant patches ſuch plants as ſtand too thick	0	13	0
Digging an acre for receiving the roots	2	10	0
Tranſplanting	1	5	0
Hand-weeding and hand-hoeing the rows, with a four-inch hoe that cuts downwards, and then with a larger plantation-hoe which cuts horizontally	1	0	0
Two horſe-hoeings	0	5	0
Total	6	12	0

It is true, the expences of raiſing lucern, in this manner, will vary, when applied to parts of England different from thoſe where the experiment was made, as the price of labour may be dearer, and rents run higher; but then the ground ought to prove better, which will balance the difference.

This plantation of lucern may be cut three times the firſt year after tranſplanting, as ſome repayment for the out-going expences: next year the profit will be more conſiderable.

On the other hand, thoſe who prefer the drill-method of raiſing lucern, as leſs expenſive, may ſeem to ſave about two pounds, or more, upon an acre, at the firſt appearance of things; but then the rows, in caſe the crop ſucceeds (which is a doubtful point) muſt be thinned with good judgment, which will coſt money; and the vacancies in them muſt be filled at laſt with tranſplanted roots: nay, M. de Chateauvieux aſſerts, that drilled lucern will rarely be ſo large and flouriſhing as the tranſplanted; for the effects of horſe-hoeing, and the influence of manures, may prove of leſs ſervice to the roots of the former, at a depth of twelve or thirteen feet, than to the roots of the latter, whoſe fineſt imperceptible fibres will hardly deſcend above a yard perpendicular.

It is hard to ſay at what preciſe time the aſſiſtance of the hoe-plough ſhould be called in: but the owner of the plantation may venture on the attempt, I think, with ſafety, in three days after the ſecond cutting, about the begining of June; for the roots then will be tolerably well ſettled in the ground, and before that time the flat-plantation-hoe may be uſed, chuſing ſuch an one as is about eight inches and a half wide in the cutting part.

As continued hand-hoeings will be chargeable, troubleſome, and almoſt endleſs (being in truth little more than a temporary expedient, and ſlight ſcratching the ſurface of the earth) remember to make a light plough, with which you are to cultivate the ſpaces between the rows; and in this caſe you may either invent a plough according to your own fancy, or copy ſuch as are uſed at home, or in other countries, on the like occaſion.

The ſhare of this plough ſhould be ſharp, about ſixteen inches long, with a coulter proportionable; the plough itſelf no heavier than a ſtrong lad of fifteen years of age can carry: and thus one horſe, after ſome obſtructions of no great conſequence in the firſt attempt, will afterwards draw it with eaſe. Yet ſtill the trouble will be leſſened, if the field be prepared by digging and picking up the roots and ſtones, inſtead of common ploughing, juſt before the ground is to receive the tranſplanted roots; therefore, after a full ſecond conſideration, the former practice is recommended preferably to the latter; and if the lucern ſtands nine or ten years, the difference of the expence will not be perceived.

As the rows will be one yard four inches aſunder, there will be room ſufficient to guide the plough ſafely along the intervals, and yet no room to ſpare: it behoves the ploughman therefore to be extremely careful in the ſlice he cuts next the lines: ſuch a ſtroke muſt be a ſhallow and a dexterous one, nor muſt he approach too nearly. A man, an horſe, and a boy to lead the horſe, will manage an acre in a day, when they know their buſineſs; for it is more a matter of nicety than fatigue, ſince the ground ploughed in an acre will hardly exceed half an acre.

After the firſt time of uſing the horſe-hoe plough (which a man's own diſcretion, upon conſidering the ſtrength of the plants, will beſt determine) it may be laid down for a general rule, that it will be always found moſt convenient to horſe-hoe the intervals (as long as the plantation ſtands) the third day after each cutting; for by that time the new ſhoots will make the plants viſible, nor will any ſide branches ſtand in the plough's way.

It may be proper alſo to hand-weed the lines once a year; and the larger weeds may be taken up expeditiouſly with the three-pronged ſpade or the field-ſpade.

We will now conſider the expences of an acre of lucern the ſecond year, which will ſtand as follow:

	l.	s.	d.
Clearing the lucern-plants from weeds in the rows by hand — — —	0	8	0
One hand-hoeing of the intervals —	0	8	0
Four horſe-hoe ploughings — —	0	11	0
Compoſt-dreſſing for manure, or ſoot, or wood, peat aſhes, at an average per year	0	10	0
Diſperſing the manure — — —	0	3	0
Total	2	0	0

Such will be the yearly charges, or in ſome proportion very like them, during the continuance of your lucern, which I fix at a medium of ten years: M. de Chateauvieux ſays it may laſt twenty; and Pliny goes as far as thirty; though the expreſſion may be looked upon to be exaggerated.

In regard to manuring lucern, it may ſuffice to ſuggeſt here in general terms, that if the ground be ſtiff, cold, and of a clayey tendency, then wood-aſhes, ſoot, and lime, are proper dreſſings. If the ground be hot, ſhallow, and braſhy, a compoſt of calcined clay, dung rotted to a fine mould, and pond mud, long expoſed to ſun and froſts, and frequently turned, may have its uſe: and if the ground proves of a middle nature, then malt-duſt will not be amiſs. All theſe manures are eaſily procured, and therefore we have mentioned none that are ſcarce and dear: but as variations of ſoil are infinite, and few people know the true nature of any field (eſpecially if it be of the mixed kind) we recommend the compoſt dung-hill, as the ſureſt and moſt univerſal aſſiſtant upon ſuch occaſions.

Many other manures may be good for lucern, but dung probably is not one of the beſt, except it be very old, and well corrected with proper mixtures of a ſweet, as well as fertilizing nature, ſufficiently warm and cheriſhing, but no ways rank; for dung (eſpecially if it be new) produces in general very luxuriant, troubleſome weeds, inſects in abundance of various kinds, and gives the graſs a foul, cloying, putrefied taſte.

The owner's eye, it is true, may be deceived, and his hopes encouraged by the largeneſs of the crop; but the ſagacious four-footed animals will diſtinguiſh better than we can pretend to diſtinguiſh; and if they could preſent a petition to their maſters, as the white heifers are reported once to have done to the emperor Julian, they would remonſtrate not a little againſt the immoderate uſe of this manure. Nevertheleſs, aſſertions like the preſent ought to be confirmed by ſome proof: an experiment therefore was made upon four acres of graſs ground, of which one half was dreſſed with ſtable dung, and the other with wood aſhes kept dry. The former moiety appeared the moſt rich and luxuriant of the two, but the cattle always neglected it, till they had bitten the latter down to the bare earth.

Having thus given the reſult of my experience in regard to dung as a manure for lucern, I ſhall ſubjoin only one ſhort caution, which is, that no dung, not even of the beſt kinds, muſt be ſpread on a lucern plantation, till it be two years old at leaſt.

In all grounds inclinable to moiſture, and ſuch particularly as are of a clayey caſt, it is pretty certain, that the preference ought to be given to ſoot-dreſſing; and, after ſoot, to chimney-aſhes (thoſe of green wood eſpecially) provided they are houſed and ſecured from wet; then ſoap-boilers aſhes may take place, coal-aſhes well ſifted, charcoal-aſhes, and malt-duſt; nor might the aſhes of lime be amiſs, nor lime itſelf, when mixed with ſuch fine mould as may be found under a ſhort ſweet turf, in lanes or commons. The compoſt-dunghill alſo, as obſerved before, ſhould be applied to, which, at the end of twelve months, having been thrice turned, will ſpread almoſt as well as aſhes or ſoot: nor will ſuch compoſt want ſtrength when it is rightly managed: for if the dunghill be moiſtened at times with the brine, ſoap-ſuds, diſh-waſhings, and chamber-lie, &c. of the family, then, when it is removed into the fields, the ſharp, pungent, ſtrong ſalts, which fly off, will make the labourers ſneeze, and occaſion a ſmarting in their eyes.

When you manure lucern with ſoot, dry chimney-aſhes, lime, ſoap-boilers aſhes, &c. it is ſufficient to dreſs the rows only, becauſe theſe finer ſorts of manure may be diſperſed in the niceſt, exacteſt quantities, if ſown in the Berkſhire manner, with a peat-aſh ſpoon; but if coarſer manures are to be employed in larger quantities, as old dung, marle, compoſt-dreſſings, &c. I would then adviſe the proprietor of the field to manure the intervals and rows promiſcuouſly.

Nothing can be more cheaply and eaſily managed than manuring lucern with ſoot-dreſſings; for the labourer, if he makes uſe of a peat-aſh ſpoon and ſeed-lip, may ſprinkle the rows of an acre in four or five hours, walking down the firſt interval and returning by the ſecond, and ſo progreſſively.

Aſhes may be ſown in the ſame manner.

It may not be amiſs to anſwer a couple of queſtions which have been often propoſed.

The firſt queſtion is, How, and in what manner (by way of reſult from the conſiderable number of experimeets made by me) I would adviſe any gentleman to prepare three or four acres of land for receiving lucern? this being an undertaking of ſome moment.

The ſecond queſtion is, How to perform this work in the ſhorteſt, ſafeſt, and moſt œconomical manner? Concerning both which points my ideas are as follow, this only premiſed, that I am here endeavouring to make the expence of the undertaking as cheap as poſſible; otherwiſe, where people pay no regard to a few incidental charges, I would recommend Mr. Boyle's method of preparing a field for receiving tranſplanted lucern, who began his experiments of lucern in the ſame year that I did, but proceeded upon a larger ſcale; for he undertook the culture of ſix acres at once.

His preparation of the field was as follows:

In the year 1757, he gave his field a ſummer fallow, and having thoroughly ploughed and harrowed it (not as farmers underſtand theſe words, but effectually, inſtead of ſuperficially) he ſowed wheat after the ground had been dreſſed with lime. In 1758, his crop of wheat was very great. Immediately after harveſt, he gave the land in queſtion a ſevere diſcipline, uſing every method for pulverizing the earth, and extirpating weeds, that the beſt

husbandmen are accquainted with, either in our kingdoms or abroad; so that the field appeared again a perfect fallow. Then ploughing it very narrow and sharp, he made water thoroughs with the plough, and left it in this condition for the winter 1758.

In spring 1759, he made many French drains in the field, as before he had made open ones for the winter; and, by stone-picking the land, had nearly stones sufficient to fill them. In March the same year (taking advantage of the first fine weather) he slit the ridges with the plough, and reduced the land to the finest tilth he was able, and transplanted the lucern from his nursery in autumn; in the whole process of which he followed Du Hamel exactly.

Nothing in husbandry could be more sensible and masterly, than this preparation of a large piece of land for receiving lucern.

In the present case it may suffice to say, that supposing the nursery to be properly prepared, and the seeds sown in the first week of April, before the season for transplanting, according to directions already given; I would recommend a field in good tilth, after barley harvest, and before oats have been sown in it. This field should be thoroughly ploughed and harrowed twice, which we will suppose to be, for example, in the autumn of the present year, 1764. After each ploughing and harrowing, there should be a very diligent burn-beating. But if the season should prove too wet at the time of a second burn-beating, we make a virtue of necessity, and the weeds and trumpery must be raked together and carried off.

Then give the field a trench-fallow ploughing for winter, and early in March, 1765 (if the weather any ways permits) having manured your ground as the relative nature of the soil requires, and ploughed and harrowed it again to an exquisite fineness, drill in a crop of field-pease, as early in the spring as is convenient with prudence and safety; for this crop must be ripe, and removed, by the last day of July. Much depends upon this point of foresight: however the pease, by standing thinner than in hand-sown promiscuous crops, being at the same time banked and hoed with greater ease, and enjoying more room, free air, and sun-shine, will, in all probability, gain an advance of ten days at least in their ripening. This will be a great point secured; for it is in husbandry as in war; there are critical moments, which never present themselves a second time in the same campaign.

This pea-crop being hacked, and moved from the field by the fourth or fifth of August, call in all the assistance you have of husbandry-strength, or can procure, and plough and harrow the field, and burn the pea-roots, weeds, &c. as often as you have time, before the twentieth of August; and then (your nursery being supposed to be in perfect readiness) transplant your roots as before directed, and contrive to close your work by the end of the month."

Mr. Lullin de Chateauvieux has obliged the world with many valuable experiments, on the culture of lucern, which must not be omitted here: but it may not be amiss to give first Mr. Miller's directions for cultivating lucern, as it has been often mentioned in the article. They are as follows:

"After having well ploughed and harrowed the land very fine, you should make a drill quite across the ground, almost an inch deep, into which the seeds should be scattered very thin: then cover them over a quarter of an inch thick, or somewhat more, with the earth: then proceed to make another drill, about a foot and a half from the former, sowing the seeds therein in the same manner as before, and so proceed through the whole spot of ground, allowing the same distance between row and row, and scatter the seeds very thin in the drills. In this manner an acre of land will require about six pounds of seed; for when it is sown thicker, if the seeds grow well, the plants will be so close as to spoil each other in a year or two, the heads of them growing to a considerable size, as will also the roots, provided they have room. I have measured the crown of one root, which was in my possession, eighteen inches diameter, from which I cut near four hundred shoots at one time, which is an extraordinary increase, and this upon a poor dry gravelly soil, which had not been dunged for many years, but the root was at least ten years old; so that if this crop be well cultivated, it will continue many years, and be equally good as when it was first sown: for the roots generally run down very deep in the ground, provided the soil be dry; and although they should meet a hard gravel a foot below the surface, yet their roots would penetrate it, and make their way downwards, as I have experienced, having taken up some of them, which were above a yard in length, and had run two feet into a rock of gravel, so hard as not to be loosened without mattocks and crows of iron, and that with much difficulty.

"The reason for directing this seed to be sown in rows is, that the plants may have room to grow; and for the better stirring the ground between them, to destroy the weeds, and encourage the growth of the plants, which may be very easily effected with a Dutch hoe, just after the cutting the crop each time, which will cause the plants to shoot again in a very little time, and be much stronger than in such places where the ground cannot be stirred: but when the plants first come up, the ground between should be hoed with a common hoe; and if, in doing of this, you cut up the plants where they are too thick, it will cause the remaining to be much stronger. This hoeing should be repeated two or three times while the plants are young, according as the weeds are produced, observing always to do it in dry weather, that the weeds may the better be destroyed; for if it be done in moist weather, they will root and grow again.

"With this management, the plants will grow to the height of two feet or more, by the beginning of August, when the flowers will begin to appear, at which time the lucern should be cut, observing to do it in a dry season, if it is to be made hay, and keep it often turned, that it may soon dry, and be carried off the ground; for if it lie long upon the roots, it will prevent their shooting again. After the crop is taken off, you should stir the ground between the rows with a hoe; to kill the weeds, and loosen the surface, which will cause the plants to shoot out again in a short time; so that by the beginning of September there will be shoots four or five inches high, when you may turn in sheep upon it to feed it down: nor should the shoots be suffered to remain upon the plants, which would decay when the frosty weather comes on, and fall down upon the crown of the roots, and prevent their shooting early in the succeeding spring.

"The best way therefore is to feed it until November, when it will have done shooting for that season: but it should

should not be fed by large cattle the firſt year, becauſe the roots being young, would be in danger of being deſtroyed, either by their trampling upon them, or their pulling them out of the ground: but ſheep will be of ſervice to the roots by dunging the ground, provided they do not eat it too cloſe, ſo as to endanger the crown of the roots.

"In the beginning of February, the ground between the rows ſhould be again ſtirred with the hoe, to encourage them to ſhoot again: but in doing of this you ſhould be careful not to injure the crown of the roots, upon which the buds are at that time very turgid, and ready to puſh. With this management, if the ſoil be warm, by the middle of March the ſhoots will be five or ſix inches high, when, if you are in want of fodder, you may feed it down till a week in April; after which it ſhould be ſuffered to grow for a crop, which will be fit to cut the beginning of June, when you ſhould obſerve to get it off the ground as ſoon as poſſible, and ſtir the ground again with the Duch hoe, which will forward the plants ſhooting again, ſo that by the middle or latter end of July, there will be another crop fit to cut, which muſt be managed as before; after which it ſhould be fed down again in autumn: and as the roots by this time will have taken deep hold in the ground, there will be little danger of hurting them, if you ſhould turn in larger cattle; but you muſt always obſerve not to ſuffer them to remain after the roots have done ſhooting, leſt they ſhould eat down the crown of the roots below the bud, which would conſiderably damage, if not deſtroy them.

"In this manner you may continue conſtantly to have two crops to cut, and two feedings upon this plant, and in good ſeaſons there may be three crops cut, and two feedings, which will be a great improvement, eſpecially as this plant will grow upon dry barren ſoils, where graſs will come to little, and be of great uſe in dry ſummers, when graſs is often burnt up: and as it is an early plant in the ſpring, ſo it will be of great ſervice when fodder falls ſhort at that ſeaſon, when it will be fit to feed at leaſt a month before graſs or clover; for I have had this plant eight inches high by the tenth of March, old ſtyle, at which time the graſs in the ſame place has ſcarcely been one inch high.

"That cold will not injure this plant, I am fully ſatisfied; for in the very cold winter, anno 1728-9, I had ſome roots of this plant which were dug up in October, and laid upon the ground in the open air till the beginning of March, when I planted them again, and they ſhot out very vigorouſly ſoon after: nay, even while they lay upon the ground, they ſtruck out fibres from under the ſide of the roots, and had begun to ſhoot green from the crown of the roots. But that wet will deſtroy the roots, I am fully convinced; for I ſowed a little of the ſeed upon a moiſt ſpot of ground for a trial, which came up very well, and flouriſhed exceedingly during the ſummer ſeaſon, but in winter, when the great rains fell, the roots began to rot at bottom, and before the ſpring moſt of them were deſtroyed.

"The beſt places to procure the ſeed from, are Switzerland and the northern parts of France, which ſucceeds better with us than that which comes from a more ſouthern climate: but this ſeed may be ſaved in England in great plenty; in order to which, a ſmall quantity of the plants ſhould be ſuffered to grow uncut till the ſeeds are ripe, when it muſt be cut, and laid to dry in an open barn, where the air may freely paſs through: but the ſeed muſt be defended from the wet; for if it be expoſed thereto, it will ſhoot while it remains in the pod, whereby it will be ſpoiled. When it is quite dry, it muſt be thraſhed out, and cleanſed from the huſk, and preſerved in a dry place till the ſeaſon for ſowing it: and this ſeed ſaved in England is much preferable to any brought from abroad, as I have ſeveral times experienced; the plants produced from it having been much ſtronger than thoſe produced from the French, Helvetian, and Turkey ſeeds, which were ſown at the ſame time, and on the ſame ſoil and ſituation.

"I am inclinable to think that the reaſon of this plant's not ſucceeding, when it has been ſown in England, has either been occaſioned by the ſowing it with corn, with which it will by no means thrive (for though the plant be very hardy when grown pretty large, yet at its firſt coming up, if it be incommoded by any other plant or weeds, it ſeldom does well; therefore it ſhould always be ſown by itſelf, and carefully cleared from weeds until it has ſtrength, after which it is not eaſily deſtroyed;) or, perhaps, people have ſown it at a wrong ſeaſon, or in wet weather, whereby the ſeeds have rotted, and never come up, which hath diſcouraged their attempting it again: but however, the ſucceſs has been, I dare aver, that if the method of ſowing or managing this plant, which is here laid down, be duly followed, it will be found to thrive as well as any other ſort of fodder now cultivated in England, and will continue much longer: for if the ground be duly ſtirred after the cutting of each crop, and the firſt crop fed, as hath been directed, the plants will continue in vigour twenty years, or more, without renewing, provided they are not permitted to ſeed, which would weaken the roots more than four times cutting would do.

"The hay of this plant ſhould be kept in cloſe barns, it being too tender to be kept in ricks open to the air as other hay: but it will remain good, if well dried before it be carried in, three years. The people abroad reckon an acre of this fodder ſufficient to keep three horſes all the year round: and I have been aſſured by perſons of undoubted credit, who have cultivated this plant in England, that three acres of it have fed ten cart-horſes from the end of April to the beginning of October, without any other food, though they have been conſtantly worked. Indeed the beſt uſe that can be made of this graſs, is to cut it and give it green to the cattle. Where this hath been daily practiſed, I have obſerved that by the time the field has been cut over, that part which was firſt cut, hath been ready to cut again; ſo that there has been a conſtant ſupply in the ſame field, from the middle of April to the end of October, when the ſeaſon has continued long mild; and when the ſummers have proved ſhowery, I have known ſix crops cut in one ſeaſon: but in the dry ſeaſons there will be always three. When the plant begins to flower, it ſhould then be cut: for if it ſtands longer, the ſtalks will grow hard, and the under leaves will decay, then the cattle will not ſo readily eat it. Where there is a quantity of this cultivated, ſome of it ſhould be cut before the flowers appear, otherwiſe there will be too much to cut within a proper time.

"When this is made into hay, it will require a great deal of making: for as the ſtalks are very ſucculent, it muſt be often turned, and expoſed a fortnight before it be fit to houſe; for this requires a longer time to make than ſainfoin: therefore, when it is cut, it ſhould be carried to

make

make upon ſome graſs-ground; becauſe the earth in the intervals of the rows will waſh up, and mix with the hay in every ſhower of rain; and, by carrying it off as ſoon as it is cut, the plants will ſhoot out again ſoon: but it is not ſo profitable for hay, as to cut green for all ſorts of cattle, but eſpecially horſes, which are extremelyfond of it; and to them it will anſwer the purpoſe of both hay and corn, and they may be worked at the ſame time juſt as much as when they are fed with corn, or dry food." *Miller's Gard. Dict.*

EXPERIMENTS *on Lucern cultivated according to the New Huſbandry, by* M. de Chateauvieux.

"It is truly with regret, ſays M. de Chateauvieux, that I am forced to treat a ſubject of this importance, in ſo ſummary a way as the limits of this letter require. However, I hope that even this general account of my experiments may be a guide to thoſe who would cultivate this plant. Many perſons who live at a conſiderable diſtance from this place [Geneva] have already followed my example, and are extremely well ſatisfied with their ſucceſs.

"Though I agree with M. Duhamel and the other partiſans of the New Huſbandry, that lucern and ſainfoin thrive beſt when cultivated in beds; yet my practice differs, in many reſpects, from theirs. This difference conſiſts in,

1. *The Principle which I apply particularly to the Culture of Lucern.*

"Lucern grows naturally with one large perpendicular, or tap-root, which penetrates very deep into the earth, and has few, if any, lateral roots. From ſimilar experiments on other tap-rooted plants, I was induced to think, that this too, by tranſplanting it, and at the ſame time cutting off part of its tap-root, might be made to ſhoot out ſeveral horizontal roots, which, reaching into the looſe mould of the alleys, and extending themſelves there, would collect a greater quantity of nouriſhment for the plant, and conſequently enable it to produce more abundant crops.

"The event has proved, that when we reaſon on ſound principles, we ſeldom err. My tranſplanted lucern puſhed out numbers of large lateral roots, and theſe branched out again into others, which may be multiplied without end by frequent culture of the alleys: for the horſe-hoe has the ſame effect on theſe horizontal roots as cutting has upon the tap-root.

2. *The Method of tranſplanting the Lucern.*

"I made ſeveral beds, ſome about three feet wide, (including the alleys) into which I tranſplanted a ſingle row of lucern; others about three feet nine inches, into which I tranſplanted two rows; and others about four feet three inches wide, in which I put three rows. The deſign of this variation was, to ſee by which of theſe three methods the ſame extent of ground would produce the greateſt quantity of lucern. I believe it will require five or ſix years to determine exactly which of them will be beſt; becauſe, as the plants increaſe every year in bulk, their produce alters, and may perhaps not keep in proportion to their firſt years, though probably the difference would not be great. But without waiting ſo long, I can already ſee, that the crop will be greateſt by planting only one row on each bed.

"The plants in the ſingle rows were ſix inches aſunder, nor ſhould they ever be nearer; and thoſe in the double and triple rows, were eight or nine inches diſtant from each other. I muſt obſerve, that I likewiſe ſowed lucern with the drill, in beds, in which it has remained without tranſplanting. It is very fine; but not near ſo ſtrong and flouriſhing as that which I tranſplanted. When lucern is ſown where it is to remain, it neceſſarily requires being thinned, and that operation takes up more time than tranſplanting it would do."

Rules to be obſerved in tranſplanting Lucern into Beds.

"1. The middle of the beds muſt be raiſed and arched as high as poſſible; and as the lucern is to remain ſeveral years on the ſame ground, no pains ſhould be ſpared to prepare the earth as well as can be.

"2. Lucern ſhould be ſown in the ſpring, and in a rich mould, that the plants may be ſtrong enough to tranſplant in September.

"3. Plants two or three years old may be tranſplanted as well as younger ones.

"4. They ſhould be tranſplanted in September, that they may have time to take freſh root before the winter comes on.

"5. If they cannot conveniently be tranſplanted in September, it may be done in October, provided the weather be not froſty.

"6. The mould into which they are tranſplanted ſhould be moiſt; and if the weather be ſomewhat rainy, it is ſo much the better. In this caſe, I have never found it neceſſary to water the plants.

"7. If lucern is tranſplanted in November or December, there is danger of the froſts forcing many of the plants out of the ground.

"8. If too warm and dry a ſeaſon prevents tranſplanting in September or October, it is beſt to ſtay till the winter is paſt. The plants will then be ſure of taking root, and very few of them will fail.

"9. If they can be tranſplanted in autumn, they will yield pretty good crops the next year: but if they are not tranſplanted till ſpring, the next year's crop will be but indifferent.

"10. The plants muſt be taken up out of the nurſery, with great care and patience, that their roots may not be damaged.

"11. The roots ſhould be left about ſix or ſeven inches long, and the green tops ſhould be cut off within about two inches of the crown of the root.

"12. The plants will take root the ſooner, if they are put into water as ſoon as they are taken up, and kept in it till they are planted.

"13. They are planted in holes made with a planting ſtick, in the ſame manner as cabbages or lettuces are planted in a garden.

"14. The beſt way of planting lucern is, to cut a ſtrait channel two or three inches deep, and ſet the plants in the bottom of it, covering them up to the neck.

"15. Great care ſhould be taken not to ſuffer any weeds to grow among the lucern; at leaſt for the two or three firſt years. To this end, the rows ſhould be weeded by hand, as well as the edge of the alleys near the plants, where the horſe-hoe cannot go.

"16. The

" 16. The alleys may be ſtirred, eithr with the ſingle cultivator, or the cultivator with two mould-boards; which, at the ſame time that it deſtroys the weeds, keeps the mould looſe.

" 17. The firſt ſtirring may be given with the ſingle cultivator, with which a furrow may be cut on each ſide of the main furrow in the middle of the alleys, by which means the earth will be turned over on both ſides of it.

" 18. The ſecond ſtirring may be given by the cultivator with two mould-boards, by drawing it along the middle of the alleys. This will turn the earth towards the rows. By theſe alternate ſtirrings, the alley will be conſtantly kept in a looſe ſtate.

" 19. This culture is ſo eaſily performed, and in ſo ſhort a time, that it may be repeated frequently. In this I differ from M. Duhamel, who orders it but ſeldom. My opinion is, that the alley ſhould be ſtirred once a month, during the whole time that the lucern is in a growing ſtate.

" 20. If the alleys be kept from weeds, leſs ſtirring them may do: but the mould ſhould never be ſuffered to grow too hard.

" 21. As ſoon as ſome of the plants begin to bloſſom, the lucern ſhould be cut. It will then make excellent fodder, ſuperior to every other kind.

" 22. The lucern hay ſhould be dried as quick as poſſible, and frequently turned. The leſs it is expoſed to the heat of the ſun, the better fodder it makes.

" 23. Lucern muſt not be houſed till it is dry: but at the ſame time care muſt be taken that it be not too dry: for then many of the leaves will fall off, as they dry ſooner than the ſtalks.

" 24. Cattle muſt not have too much lucern given them at a time, till they are accuſtomed to it.

" 25. No cattle ſhould ever be ſuffered to feed on the beds of lucern. If the earth is very dry, towards the latter end of autumn, ſheep will do it the leaſt hurt. If the plants are then tall enough to be mowed, the beſt way is to cut them, and give them green to the cattle.

" Theſe rules contain all that is eſſentially neceſſary for making and keeping in good order this kind of artificial paſture. I can ſafely ſay, that whoever tries them, will be abundantly rewarded for his trouble and expence. Saintfoin may be cultivated in the ſame manner."

Account of the Produce of Lucern planted in Beds, and cultivated according to the Principles of the New Huſbandry: with ſome important Reflections on the Advantages which may be obtained therefrom: by M. de Chateauvieux.

" No judgment ſhould be formed of what lucern may produce, by the crops of the firſt or ſecond year: it is then too young to be able to yield much. If we were to calculate even by its third year's produce, we ſhould ſtill conſider, that as the plants increaſe every year in bulk and vigour (and where they will ſtop I am not yet able to determine) the produce will be proportioned to that increaſe, and conſequently the crop of each ſucceeding year will be greater than that of the former.

" The crops I am going to ſpeak of, are thoſe of the ſecond and third year: but my calculations will be made on that of the third year. It is proper to remember, that the years 1753 and 1754 were uncommonly dry, ſo much that, ſometimes, not a drop of rain, nor ſcarce any dew, fell betwen the cutting of one crop and that of another. The ſeaſons were ſo unfavourable to the production of graſs, that hay roſe to an exceſſive price.

I ſhall firſt ſay what was the ſtate of the plants of lucern in the third year, and afterwards how much hay they yielded.

State of the Plants in their third Year.

" As the part of the plant which I now conſider is that which is buried in the earth, I uncovered numbers of them, that I might be able to judge of their general ſtate. I was greatly ſtruck with the effect which tranſplanting had had upon them. Inſtead of one perpendicular root, which they uſually have, all theſe plants had three, four, five, and ſometimes more, almoſt equally big roots. They were, in general, three quarters of an inch in diameter, and proceeded from the original root, which was now at leaſt an inch in diameter, and in many of the plants an inch and a half. After the moſt careful ſearch that I could poſſibly make, I could not find one plant of lucern ſown in the common way, though it had ſtood twelve, twenty, or more, years, whoſe tap-root had grown to the bigneſs of an inch diameter: few of them were above half, or at moſt three quarters of an inch thick. This difference is very great.

" I likewiſe found, that the roots of the tranſplanted lucern had produced another kind of roots, of which I ſaw none about thoſe of the old lucern. Theſe were a great number of fibrous roots, ſome of which were already one twelfth of an inch in diameter, and looked as if they would alſo become principal roots.

" The ſtalks ſeem to riſe out of the earth; and from the firſt time of cutting them, a kind of head forms juſt above ground, which extends itſelf every year. The firſt year, this head was two or three inches wide: the ſecond year it was generally about ſix inches over, and this third year, almoſt half the plants have a crown ten or twelve inches in diameter: and as many of them have grown ſo as to touch one another, their crowns are become of an oval form, having extended themſelves on the ſides where they met with no reſiſtance.

CROPS.

" I have a field of lucern in beds, divided into two parts. This is the third crop of lucern off one of them. The beds are 250 feet long. In 1753, I cut this lucern ſix times, viz. in May, June, July, Auguſt, September, and the beginning of November. This laſt cutting was not near ſo plentiful as the others, and I dried it within doors.

" Theſe cuttings off one bed, on which there was but one row of lucern, yielded 140 pounds of well dried hay.

" In 1754, the lucern was late before it began to ſhoot, and the earth was drier than the year before. I had but five crops: the firſt was cut on the 27th of May; the ſecond on the firſt of July; the third on the 27th of July; the fourth on the 26th of Auguſt; and the fifth on the 23d of October. Theſe five cuttings yielded in all 225 pounds of well dried hay off each bed.

" A field 250 feet long, which was the length of my beds, and 210 feet wide, contains an arpent of our meaſure. This arpent, divided into ſixty-eight beds, each three feet wide, producing after the rate of 225 pounds of hay off each bed, would yield in all 15300 pounds; which is infinitely more than is ever obtained in the common way.

" The

" The beds with three rows yielded much leſs. The third year, their crops amounted to no more than 169 pounds off each bed, which is a fourth leſs than the others: and as theſe beds are wider, inſtead of having ſixty-eight, as in the former diſpoſition of the arpent, there will be only forty-ſeven, each four feet three inches wide, the total produce of which will be but 7943 pounds: conſequently this arpent will yield little more than half as much as an arpent laid out in beds three feet wide, planted with only ſingle rows.

Remarks by M. de Chateauvieux.

" The plants of lucern had the fate of all kinds of plantations: that is to ſay, ſome of them were more vigorous than others. The greateſt number of the plants produced each of them a pound of dry hay, and ſome of them yielded two pounds. I look upon theſe laſt as ſuch extrordinary productions, that I do not expect many of them to yield the like quantity again. I think one may be very well ſatisfied, if the plants, one with another, yield a pound of hay a piece every year. This is nearly the reſult of my experiment on beds which had but one row; and the produce of theſe would have been ſtill greater, if many of my plants had not failed: in the room of which I ſet young ones, which could not acquire ſufficient ſtrength to yield full crops.

" In theſe experiments, I have employed no dung: neither have I for any of my corn fields. I have reſerved it for improving my paſtures and meadows; and intend next to apply it to my lucern, which, I doubt not, but will be much the finer for it. The only thing now remaining is, to know by experience which will be the beſt way of uſing it. I have ſome thoughts on that head, which may render it much more profitable.

Lucern deſerves to be cultivated with care: not only on account of the great quantity of fodder which it yields, but likewiſe becauſe the quality of its hay is ſuperior to any other. The New Huſbandry will render it ſtill more perfect. Plants cultivated this way enjoy the benefit of a free circulation of the air, and that circulation keeps them ſweet and ſound, and free from all muſtineſs towards their roots: for, being open to the rays of the ſun, that great ſource of kindly vegetation, they attain great perfection in all their parts, both as to their ſubſtance, and their flavour. Cattle eat this food greedily, and are better nouriſhed with it, than with any other: but as every exceſs is bad, too great a quantity ſhould not be given them at once, eſpecially at firſt, leſt it ſhould ſwell them. The beſt way is to bring them to it by degrees.

" I have experienced theſe qualities in this hay, by comparing it with every other ſort. The excellence of this, juſtifies the principles on which the New-Huſbandry is founded. I have offered to my horſes bundles of every kind of hay, and at the ſame time a bundle of this hay of lucern. They have not heſitated a moment to prefer the latter. Nothing but its ſuperior qualities could determine them in this choice, which never varied, and has always been in favour of the lucern cultivated in this manner.

" It would be laviſhing this excellent fodder, to feed horſes entirely with it. It need only be given them by turns with common hay: which will be a great ſaving: for this lucern will ſupply the place of oats. I am certain that my horſes fed partly with this hay, and without oats, will be in better plight, ſtronger, and more vigorous, than thoſe which are fed with meadow hay and corn in the uſual way. It is now ſome time ſince I have fed my coach-horſes with it, and have retrenched their oats. Inſtead of this laſt food, and at the hours they uſed to have it, I give them lucern chopt, as the Spaniards do ſtraw to their horſes. Mine are fond of it, and ſhew the ſame impatience to find it in their manger, as if it was oats; and ſince their being put under this diet, they are in better condition than before, and ſo mettleſome, that the coachman has enough to do to keep them in.

" When I ſaid that retrenching the oats would be a conſiderable ſaving, I did not ſo much mean the ſaving of the expence of that corn, as the better improving of many vaſt tracts of land which are ſown with oats, and might with proper management, produce much more uſeful and more profitable ſorts of grain, notwithſtanding the too general prejudice, that ſome lands are not capable of bearing any better. For my part, I am thoroughly ſatisfied, that whatever ground can bear a crop of oats, can likewiſe, under the New Huſbandry, bear any other grain."

Continuation of M. de Chateauvieux's *Account of his Experiments on Lucern, in the Years* 1755, *and* 1756.

" The great drought of the year 1755, was accompanied with great heat; and the year 1756 was very rainy, and moderately warm, there being but very few hot days in it.

" My lucern was expoſed to a moſt ſevere winter in 1755, when the froſt was exceſſive hard, and laſted very long. M. de Reumur's thermometer was ſome days, at different times, eight, nine, ten, twelve, and thirteen degrees below the freezing point; and on the third of February a thermometer in the open air ſtood at ſixteen degrees below freezing. Theſe ſevere froſts made me uneaſy for my lucern, which, however, bore them without receiving any damage.

" The rains in 1756 did no hurt to theſe plants, but they prevented my cutting them at proper times. I had but four crops of lucern this year, being obliged to wait for an appearance of fine weather to dry it in, before I could venture to cut it down. Theſe rains likewiſe hindered my giving the proper hoeings to the alleys, which were full of weeds during the ſummer and autumn. I choſe rather to leave them in that condition, than attempt to hoe them while the ground was over wet, not doubting but the ſpring hoeings would eaſily deſtroy them.

" In 1755, I cut my lucern five times: the firſt was, on the third of May, before any flowers appeared: the ſecond on the twelfth of June: the third, on the fifteenth of July: the fourth on the twenty-firſt of Auguſt: and the fifth, on the ſeventh of October. I was obliged to finiſh the drying of this laſt cutting, in barns and under cover.

" In 1756, which was the fifth year of theſe plants, I cut them but four times: the firſt, on the third of June: the ſecond, on the firſt of July: the third, on the fourth of Auguſt: and the fourth on the twenty-ſeventh of September.

A bed 250 feet long, with only one row of lucern,

Yielded	In 1754	225	pounds of dry hay.
	1755	197	
	1750	281	
	In three years,	703	pounds.

A bed of the ſame length, with three rows of lucern,

Yeilded	In 1754	169	pounds of
	1755	180	dry hay.
	1756	226	

In three years, 575 pounds.

Obſervations by M. de Chateauvieux.

"We ſee, by the above account of three years, that a piece of ground laid out in narrow beds, planted with only one row of lucern, yielded a greater produce than the ſame extent made into wider beds, and planted with three rows.

"I ſhall not, however, pretend to determine from this one experiment, that it is beſt to lay down large fields in this manner. I think it will be right to try firſt, whether the ſucceſs will be the ſame on different ſoils, and likewiſe on lands whoſe expoſition may be more or leſs advantageous. If after repeated trials, the beds which have but one row of plants, yield the greateſt quantity of hay, that method certainly is to be preferred. To clear up this point ſtill more to my ſatisfaction, I continue to plant lucern in beds, ſome with one and others with three rows.

"The difference between the crop of 1756, and thoſe of the two preceding years, would induce me to think that rainy ſeaſons are beſt for the production of hay: but ſtill, the greater quantity which the year 1756 produced, muſt not be imputed to the rain only: we ſhould likewiſe conſider that the plants had throve greatly ſince 1754; that their ſtems were grown much larger, and their roots much ſtronger and more numerous, and that they were conſequently able to yield much greater crops than before. They have abundantly anſwered my expectation, both as to quantity and quality.

"With reſpect to the quantity, it is much greater than that of any common fodder: I mean, of any that the ſame extent of ground would have produced, if cultivated in the common way, though it would then have been covered with an immenſe quantity of plants. This is a fact, which numbers of experiments prove, and which we ſhall ceaſe to wonder at when we conſider the great effects of the frequent ſtirring of the alleys. To this it is that I owe the repetition of my crops, and their being all of nearly equal goodneſs. I do not exaggerate when I ſay, that every ſummer month, which is the time I generally allow between each cutting, will produce ſhoots two feet long, and ſometimes more: and ſuppoſing that I cut them but five times a year, each plant will have produced after the rate of nine or ten feet length of ſhoots, and that in the ſame time that moſt meadows will not produce graſs above two feet long.

"As to the quality of this hay, I continue to prefer it to all other fodder. My experience has confirmed what I ſaid of it in 1754; and I ſhall only add, that I have ſince found, that it is as good at the end of four years, as when it is firſt cut. If there was any difference, horſes would ſoon be ſenſible of it: but they eat of either without diſtinction.

"I feed my horſes with it, chiefly in the ſummer, at which time they do moſt work, and am more and more ſenſible of the advantages of it. Five or ſix pounds of lucern a day, are ſufficient for a middle ſized horſe: but the quantity may be increaſed or diminiſhed, according as the horſe is nouriſhed by it: for in that there is great difference." *Culture des Terres, tom.* IV. *c.* iii. *art.* 15.

The following account of the cultivation of lucern, was communicated to the public by a very ingenious huſbandman, and merits the attention of the reader.

Having read and heard a great deal of lucern, I determined to have ſome of it myſelf; and Mr. Miller's method ſeeming to me by far the moſt rational, I reſolved to follow it: accordingly, the ſeventeenth of July, 1763, I ordered a field of three acres and a half, then under rye-graſs and clover, to be ploughed deep, and ſown with turnips. The crop was middling: I ſold them to a cow-farmer for nine guineas: he drew and carted them home. If I had had ſheep, I would have fed them on the field.

By the twenty-ſeventh of March, 1764, the field had been twice ploughed, the firſt time ten, and the laſt time near twelve inches deep, with the Rotheran-plough and four horſes a-breaſt: the ſoil is light and ſtony, with a rock of gravel about ten or twelve inches deep, and had never before been ploughed above ſix or ſeven inches deep; however, I knew it was right to go as deep as I could for a tap rooted plant, as the lucern is.

I was greatly pleaſed with reading M. Lullin de Chateauvieux's account of his method of tranſplanting lucern, and determined to follow it, from a full conviction that it muſt be ſuperior to every other method.

Accordingly I ordered the field to be ſown with Poland oats, and laid out about twenty-eight rods in beds four feet wide, alleys one foot and a half, which were ſown with lucern in broad-caſt by my gardener, in the ſame manner as you ſow cabbages or ſavoys in ſeed-beds: one bed, however, out of curioſity, I ordered him to ſow in the following manner.

Run a garden-line through the middle of the bed from one end to the other; draw a ſmall drill along the line, about half an inch deep; then move the line ſix inches, and make another drill, and ſo on: by this means you will have nine drills on a bed four feet wide. When this is done, fill a quart or a pint bottle near full with your lucern-ſeed, cork the bottle, bore a hole in the cork, and inſert a quill cut at each end: this will be found a great aſſiſtance in ſowing the ſeed thin and regularly in the drills: and I muſt obſerve, that the bed which I ſowed in this manner, afforded me much the greateſt quantity of plants, and by far the fineſt. Another advantage attending it is, that it is kept clean with much more eaſe, and far leſs expence; for a gardener, with the ſmall three-inch hand-hoe, will clean a great deal of ground in a ſmall ſpace of time. When the bed is ſown, the ſeed muſt be covered with care: rather chuſe the backſide of a ſmall rake than the teeth.

By the middle of Auguſt, my plants looked very well, and were moſtly in bloom, when I ordered them to be mown, and given to my horſes and cows, who ſeemed as if they had a high treat.

The oats being got in, I ordered the field to be deep ploughed again, and then waited for a ſeaſon of rain to begin my planting, which, by my journal, did not come till the fifteenth and ſixteenth of September; and the field being firſt well harrowed, we went to work the ſeventeenth, and continued planting till the twenty-ninth; nor can I now ſee any difference between thoſe planted the ſeventeenth or twenty-ninth. Though I quite agree with the author of the Eſſays, that it is beſt to plant

ſooner than I did if poſſible; yet I muſt obſerve, that what may do for gardens, or ſmall pieces of ground, will not do for fields. From the laſt week of Auguſt to the middle of September, ſeems to me a very proper time. But "filling each hole with water, making drills, half filling them with ſea-ſand or wood aſhes, and watering each plant," as the author of the Eſſays mentions, is an endleſs and very expenſive work.

For my part, I kept my eye on M. Chateauvieux's directions, as laid down above, with regard to that part that relates to planting; but another ingenious gentleman, having cautioned the public againſt planting on ridges, I muſt needs ſay, I was fearful of the rain and froſt myſelf, if planted in that manner, eſpecially on light land; and therefore I ordered my field to be ploughed as level as poſſible, and made my man, after the field was ploughed, go three bouts on each ſide the furrows, ſo that, when harrowed acroſs, you could hardly tell where they were. The field being brought to this order, as I ſaid before, we began to plant the 17th of September: two men with ſpades dug up the plants and two women cut them: ſome care is certainly required in taking them up, but I did not find it great; it was done by common labourers. The women were ordered to cut the plants to about ſix or ſeven inches long in the root, and the tops to about two inches, as M. Chateauvieux directs. They did it very handily: their method was to take them up one by one, (ſo that they could throw by the faulty ones) and when they had about a dozen in their hands, they cut them at top and bottom with one ſtroke of the knife at each end. Each had a waſhing-tub by her ſide, filled to about ſix inches with water: as they cut the plants, they ſet them in the tubs; and as they filled one tub, another was brought them.

The method of planting is the ſame as for cabbages: men who are uſed to work in gardens will do it very handily with a dibble or planting ſtick; but that mine might ſtand with all poſſible exactneſs, each man had a garden-line and reel: and as I think I ſhall be very able to keep them clean with M. Lullin's ſingle cultivator, the rows are only twenty inches apart, and ſix inches in the lines.

If I find a difficulty in keeping them clean in this method, then by drawing every other row, which may be done with great eaſe, my plants will ſtand at the diſtance directed by M. Chateauvieux, of three feet four inches.

I was very impatient to ſee the effect tranſplanting would have, and therefore, as ſoon as my plants in the ſeed-bed were about ſix inches high, I drew ſeveral, cut and tranſplanted them, and in the autumn I took up theſe plants, and found they had all formed new tap roots round the bottom of the piece (if I may ſo call it) planted, and inſtead of one, they had from five to thirteen new roots: this, you may ſuppoſe, gave me great pleaſure, and convinced me, that the illuſtrious Swiſs was quite right.

The author of the Eſſays on Huſbandry, I find, cut his plants with ſciſſars: this muſt be very tedious work; and, with ſubmiſſion, I think he is quite wrong in cutting his plants to the length of nine or ten inches. Six or ſeven inches ſeem to me a much properer length; for the ground being dug or ploughed about twelve inches, the new roots will have five or ſix inches of well-looſened mould to ſtrike into, which muſt be a great advantage to the plants; and if gravel, or a ſtrong clay, is near the ſurface, I am convinced mine, or rather M. Lullin's, is the beſt method.

Yet this gentleman ſays, he cut his tap-roots too ſhort, and knew not how to manage a root that was very ſmall: in regard to the laſt, I muſt obſerve, that, if they were very ſmall, I ordered them to be thrown away. So much has been ſaid on the neceſſity of keeping lucern in broadcaſt, drills, or tranſplanted, free from weeds, that I will ſay nothing on that ſubject.

At the ſame time that this gentleman ſo warmly recommends M. Chateauvieux's method of cultivating lucern by tranſplanting, he has, I fear, thrown a ſtumbling-block in the way of moſt gentlemen, and, I think, every farmer; I mean his calculation of the expence: this, therefore, I muſt endeavour to remove.

When I began to cultivate lucern in this manner, the only defect I could find in M. Chateauvieux's account was, that he had not told the public how much ground they were to ſet apart for a nurſery: this deficiency, however, I can ſupply to thoſe who come after me, for ſixteen rod will be about the quantity for an acre; and then, I think, the expence of tranſplanting will ſtand as follows:

	l.	s.	d.
Digging, ſpit-deep, ſixteen rods, at three-pence per rod —— ——	0	4	0
Seed, three pounds, at one ſhilling per pound	0	3	0
Weeding the nurſery twice with the three-inch hand-hoe. (By ſowing in this manner, tranſplanting will not be wanted; nor do I think it proper, as they are to be tranſplanted again) —— ——	0	3	0
Ploughing —— ——	0	10	0
Tranſplanting —— ——	1	5	0
Hand-hoeing the plantation once, the middle or latter end of October, in dry weather, which men uſed to hoeing turnips will do for three or four, but ſay ——	0	5	0
	2	10	0

This, I am perſuaded, is the full expence of making the plantation; yet the author of the Eſſays has ſtrangely worked it up to ſix pounds twelve ſhillings per acre: however, I readily ſubmit this account to the inſpection of every farmer and every gentleman in this kingdom, converſant in matters of this kind.

If the ſpring-ploughing for barley or oats has been nine or ten inches deep, then a ploughing in autumn of twelve inches will be ſufficient, and cannot be charged at more than ten ſhillings. The trenching for the ſeed-beds may be done at leiſure time; ſo may the weeding of the nurſery, and the hand hoeing of the plantation: then the real expence to the farmer will only be the ſeed and tranſplanting, or one pound eight ſhillings per acre.

As to what this gentleman calls the yearly charges, I can by no means agree to them: for the plantation having been weeded in October, will lie very ſafe and well till the latter end of February or beginning of March: then in dry weather, it may be hand-hoed again, the expence of which has before been charged at five ſhillings per acre; to which add four horſe hoeings after each cutting, at eleven ſhillings, which makes ſixteen ſhillings per acre the annual charge.

I cannot recollect any thing further that is neceſſary to be ſaid on the ſubject of tranſplanted lucern; but as I would have every one, who writes to you on ſubjects of this ſort, tell the truth, the whole truth, and nothing bu

but the truth, ſo I think it but juſt to ſay a word or two on lucern ſown in broad-caſt, or Mr. Rocque's manner. I live within a few miles of Mr. Rocque; and muſt add, that I have paid great attention to the culture and growth of lucern and burnet for ſome years paſt: ſo that I think I am pretty well acquainted with them.

The author of the Eſſays ſays, "If lucern is ſown in broad-caſt with corn, no care can keep it clean: it may laſt two years, only one crop being tolerable, and then muſt periſh in the common courſe of nature." And ſeveral of your correſpondents are alſo of opinion it will never ſucceed in this method; but I know it will; for I have ſeen it cut three or four times. To cut it four times, the ſummer muſt be very favourable, and the laſt cutting will be late. Here I muſt remark, that lucern is not only excellent as a green fodder, but as an early one, eſpecially if ſown in drills, or tranſplanted; for that ſown in broad-caſt will not be fit for cutting ſo ſoon as the former, by a fortnight or more; however, the farmer may depend on three good crops in this manner of ſowing.

In the ſpring 1760, Mr. Rocque ſowed about five acres with lucern and barley: the land is light and hot, but being in good heart, the barley was rank, which obliged him to mow it green, and ſell it to a farmer for feeding cows, &c. Indeed I believe it will always be beſt to do ſo; for the weeds, if there are any, are thus cut down, and the lucern thrives apace. The ſpring following, it may be harrowed with light harrows, and every year after with ſuch harrows as you find clean it beſt. Laſt autumn, when the weather was hot and dry, I ſaw a farmer harrowing Rocque's field with large ox-harrows, and I do not perceive that it is at all hurt. The weeds and trumpery were raked up, and carted to a dung-hill, with which he has this ſpring dreſſed his field, and it is now in a fine thriving condition.

Lucern makes moſt excellent hay: horſes are very fond of it, and, with one quartern of oats, I will be bound any gentleman will be well ſatisfied with the condition of his horſes, even coach-horſes; nor do I ſee it is at all more difficult to be made into hay than clover. *Muſeum Ruſticum, vol.* IV. *page* 307.

Experiments on Lucern, by Mr. John Wynne Baker, *publiſhed by the* Dublin *Society.*

The ineſtimable value of this plant has been ſo much ſpoken of by all the ableſt writers on huſbandry, that it is quite unneceſſary for me to ſay any thing in its recommendation.

Here follow my experiments upon it this year.

No.
15. Sown in drills, three feet aſunder.
16. Sown in drills, two feet aſunder.
17. Sown in drills, one foot aſunder.
18. Sown in the common, or broad-caſt way.

I ſowed the ſeed for theſe experiments on the firſt of May, but the middle of April would have been a more proper ſeaſon.

The lucern began to appear on the eighth day: in its firſt appearance, it has two very ſmall leaves of an oval form.

Theſe experiments were treated in the ſame manner as the burnet.

On the ſixteenth of Auguſt, I cut the lucern of each experiment, and the produce of green fodder was as follows:

Number 15. i. e. the three feet drills, produced off one perch, thirty-one pounds and a quarter.
Number 16. i. e. the two-feet drills, produced off one perch, forty-four pounds and a half.
Number 17. i. e. the one-foot drills, produced off one perch, forty-three pounds.
Number 18. i. e. the broad-caſt, produced of one perch, fifty-nine pounds.

Upon the face of theſe experiments, the broad-caſt has the greateſt produce. Above the three-feet drills, twenty-ſeven pounds and three quarters; above the two-feet drills, fourteen pounds and a half; and above the one-foot drills, ſixteen pounds.

Hence it may be concluded, by perſons not acquainted with the nature and culture of this plant, that the broad-caſt ſowing is to be preferred, as yielding the greater produce; but I think that concluſion ſhould not be too haſtily drawn, for the following reaſons.

Theſe crops are all from the firſt cutting after ſowing the ſeed, and therefore the lucern in the broad-caſt was then as good, or probably better, than it will ever be again in any ſucceeding crop, the ground being looſer, and fewer weeds in it, than there ever can be hereafter; for the natural graſs is already riſing in it, although it was managed in the way practiſed by Mr. Rocque; which is to harrow, or rake the ground after cutting the lucern. Another reaſon is, that for the firſt year the plants are in their infancy; but in three years I apprehend the drills will more than treble their produce: whereas, at that time, I ſhould fear the broad-caſt would be quite or near deſtroyed by the natural graſs. In other words, as faſt as the drilled crops improve, I do conceive the broad-caſt will diminiſh.

The culture of lucern in drills, with intervals of only one foot, I find is no better than the broad-caſt, as there is no ſuch thing as horſe-hoeing between the rows, and where the crop ſhould be large, digging would be too expenſive.

But upon the comparative experiment, between the two and three feet intervals, I confeſs I cannot ſo readily pronounce: the two feet produce the moſt, by thirteen pounds and a quarter; whether that diſtance will continue to do ſo, I cannot ſay: it may happen that when the roots become large, which is the propereſt time to aſcertain the fact, that the three-feet drills may have the greater produce: but time alone can determine this point, which really is very material to know.

Second Set of Experiments on Lucern.

Theſe experiments were calculated to diſcover how far the roots of this plant would bear being wounded, as in the culture of lucern practiſed by Mr. Rocque: I do conceive many of the roots muſt be injured, to the manifeſt diminution of the crop.

In April, 1764, I ſowed a little lucern in my garden. May the firſt, 1764, I treated ſome of the plants in the following manner, after thinning of them in the row, by taking all others from them, and leaving the plants ſingle, and about two feet aſunder.

Numb. 1. The root of this plant I ſplit from the crown of it downwards, for about an inch.

Numb. 2. The root of this plant was ſplit firſt in the ſame direction as the former, and then I ſplit it tranſverſely, for about an inch downwards.

Numb. 3. The root of this plant I cut a ſlice off one ſide, about an inch long, juſt below the crown of the root.

Numb. 4. This plant I cut the whole crown of the root off.

Numb. 5. This plant I ſplit the root of, in the ſame manner as Numb. 1. and then cut about an inch and a half off one ſide.

After wounding theſe plants, I dug the earth round them, in order to feed the fibrous roots in the nouriſhment of the plants.

They never afterwards made any figure. Towards September, Numb. 1, 2, and 3, threw out a few weak ſtems, not worth notice, but Numb. 4, and 5, never grew afterwards.

Theſe experiments I mean to repeat in a greater number, and that for two or three years together, before I ſhall venture to draw poſitive concluſions from them; but I think theſe ſeem to prove, that Mr. Roque's method is not to be preferred ſo much beyond Tull's, Duhamel's, and M. de Chateauvieux's, as his advocates would inſinuate. But the fair trial between his method and the drill, will be to experiment carefully upon them for four or five years together; my experiments in wounding the plants, being only calculated to ſupport theory by facts; for my notion of the conſequences which muſt happen from his culture, is no more than theory.

Till I made this ſet of experiments, I confeſs I never was ſenſible of the texture and firmneſs of lucern-roots, which are really very hard to cut, and not much unlike a dried ſtick, which I muſt confeſs ſeems to favour Mr. Rocque's method, ſo far as relates to my apprehenſion of the plants being wounded by his inſtruments, which, from the hardneſs of the roots, cannot wound them in the manner I did mine with a knife. And as my purſuits tend only to diſcover the truth in matters of huſbandry, for Mr. Rocque's honour, and my own credit, I could not omit to communicate this remark, as I hope the reader will believe I am endeavouring to aſcertain the beſt culture for lucern, and not writing to leſſen Mr. Rocque or his ſyſtem: every man acting in a private capacity, has a right to adopt ſuch as he pleaſes; but I, who am acting in a great meaſure for the public, think myſelf bound to be conſcientiouſly exact in my ſcrutiny of every ſyſtem, which I ſhall comparatively experiment upon. If I am miſtaken in the culture of lucern, I have the ſatisfaction of conſidering ſome of the greateſt men, who have ever wrote upon the ſubject, are no leſs miſtaken than I am.

Notwithſtanding all that has been ſaid by many writers on lucern, as to its tap-roots, yet I find it has many lateral ones, and it is only a few of the plants that ſend down but one tap-root, but an infinite number in all ſhapes and directions. At a year old, I find the healthy ones are from ten to eighteen inches long; I preſerve them of that age now by me, and intend every year to take them up, in order to have them of all ages, the better to ſee their progreſs from year to year.

Upon the firſt of laſt May, ſome of my lucern, which was ſown the year before, was eighteen inches high; but let it be obſerved, that it had the benefit of a ſouth aſpect, aided by the reflection of a fruit-wall. This induces me to believe, that a declivity with a ſouth aſpect, will be the moſt advantageous ſituation for this plant, in this country; for, although lucern will live in the ſevereſt winters, yet it flouriſhes beſt under the influence of a warm ſun; the only bleſſing we ſeem to want in this country.

In the ſummer months I obſerve, in a good ſoil, and under proper culture, it grows about an inch in twenty-four hours; ſometimes I have known it grow an inch and a half in the ſame time.

Third Set of Experiments on Lucern.

The tranſplanting lucern ſeems to have been firſt thought of by the ingenious and never ſufficiently to be praiſed M. de Chateauvieux, whoſe reaſons for every new attempt are founded upon ſuch ſolid and rational principles, that they have generally ſucceeded to his expectations. This gentleman ſays, plants of two or three years old may be planted equally well with thoſe of one year old.

My plants laſt April were all one year old, which upon taking up for the purpoſe of tranſplanting, I found differed very much in their ſize, which induced me to divide them into three parcels, *i. e.* the ſmalleſt, middling, and largeſt. Theſe I tranſplanted in the following manner, ſix inches aſunder in the rows, and the rows three feet.

Numb. 1. Forty of the ſmalleſt plants, with their tap or leading roots cut off.

Numb. 2. Forty of the middling plants, with their tap or leading roots cut off.

Numb. 3. Forty of the largeſt plants, with their tap or leading roots cut off.

Numb. 4. Forty of the middling plants, without cutting their roots.

Numb. 5. Forty of the largeſt plants, without cutting their roots.

Numb. 6. Forty of the ſmalleſt plants, without cutting their roots.

Theſe ſix rows of plants were put down the twenty-eighth day of April. I watered them at the time of putting down, and once afterwards.

Very few of them died; ſo that the different ſizes and methods ſeem to anſwer equally well the firſt ſeaſon.

I intended to have cut the produce of each experiment for weighing; but a few days before that was to be done, my horſes got into the place where it grew, and eat ſome of it, which diſappointed my purpoſe. From the appearance of the experiments reſpectively, there would have been very little, if any difference in the produce; but a third and fourth year's crop will aſcertain how far cutting off the tap-roots will benefit the plants, and how far tranſplanting is preferable to ſowing. Be it noted, that the tranſplanted roots make no great figure the firſt year.

In order to aſcertain, with ſome degree of certainty, how far lucern may be worth the farmer's attention, I laſt ſummer made an experiment with an horſe, to diſcover how much he would eat, which being known, we can, from the firſt ſet of experiments, pretty exactly tell how many horſes an acre of lucern will maintain during the ſummer months. The horſe I choſe for this purpoſe is a very large one; he had been ploughing from ſeven o'clock

o'clock in the morning till ſeven in the evening, during which time I forbid his having any thing to eat. When he was taken out of the plough, I ordered him to a ſtable by himſelf, where I had provided for him fifty-ſix pounds of lucern, without any other food for that night, of which he had eat by next morning, forty-nine pounds; a quantity, which I own ſurprized me.

Lucern will in this country, in favourable ſeaſons, mow four times in a ſummer after the firſt year, and we may ſafely calculate, that at every cutting it will yield half an hundred weight upon each perch, which at the four cuttings is two hundred weight upon a perch in the ſeaſon, or ſixteen tons upon an acre, *i. e.* thirty-five thouſand eight hundred and forty pounds. This is a low calculation; but at this rate, ſuppoſe five horſes to be allowed forty-nine pounds every twenty-four hours, which is two hundred and forty-five pounds, in that caſe an acre will maintain them one hundred and forty ſix days, which is twenty weeks and ſix days. No man will contend for it, I believe, that any natural paſture will do any ſuch thing. Add to this profit, the circumſtance of making dung all the ſummer; an object, I am ſorry to obſerve, not ſufficiently attended to in this country, amongſt the common farmers; if they can make a little for their potatoes, they ſeem to think of no more.

Lucern ſhould never be ſown upon wet or ſpungy ground, but upon dry rich land, and muſt always be kept free from weeds.

I ſowed ſome laſt April in drills, upon ground not ſix inches deep, above a lime-ſtone quarry, and it grew very luxuriantly; but the ſoil is very good.

Turneps are the beſt preparation of ground that I know of for lucern, particularly if they be raiſed in drills, in the manner before repreſented.

My lucern in the broad-caſt and one-foot drills, was infected with the ruſt or mildew, during its growth; this ſeems to be an objection to the ſowing of it with ſuch narrow intervals, or in the broad caſt way, ſince the two-feet and three-feet drills were in the ſame place, and they were not at all infected with this diſeaſe.

An Account of the comparative Advantages of cultivating Lucern, on the Drill and Broad-caſt Methods; for which the Society for the Encouragement of Arts, &c. adjudged their Premium of a Gold Medal.

The farm on which the following experiments were made, is a ſtrong clay; a ſoil, in the opinion of all writers in agriculture, the moſt unfriendly to lucern. Encouraged, however, by M. Lullin de Chateauvieux's experiments, the owner was tempted to try how the lucern would ſucceed when treated in the manner he propoſes: and in the year 1761, he ſowed a field of about three acres with lucern in drills, two feet aſunder. During the firſt year, he cauſed it to be weeded carefully; and from the places where it grew too thick, he ſupplied thoſe in which it had failed. After every weeding, he cauſed the intervals to be ſtirred with a horſe-hoe, reſembling M. Lullin's ſingle cultivator, which manifeſtly revived the plants.

In 1762, the plants throve greatly, being kept clean, and horſe-hoe'd as in the former year; and the ſociety having publiſhed a premium for a comparative trial between lucern ſown in broad-caſt, and in drills, he determined to try one part of that experiment on this field, and not to beſtow on his lucern any manure whatever, or to give it any other help than the horſe-hoe.

In 1763, the plants were arrived at a ſize to yield ſo full a crop as to maintain five horſes, from the middle of May to the end of autumn, or above five months. Theſe horſes, though conſtantly worked very hard, had neither corn or hay given them during all this time; and yet they continued in ſtrength and ſpirit, and grew fat. A horſe which in May was ſo weak, and in ſo bad a ſtate of health, that it was thought he could not live, ſoon recovered, when fed with lucern. The plants were in general between three feet and three feet and a half high, at the firſt and ſecond cutting. The plants made ſo many ſhoots, and theſe ſhoots branched ſo much, that in three weeks after every cutting, or ſometimes ſooner, the intervals quite diſappeared; the whole field being ſo equally covered, that it looked as if ſown in broad-caſt. December 1763, January and February 1764, having been uncommonly rainy, the water ſtood in ſome parts of the field; and though there was generally ſuch a declivity as that it might have been carried off, he reſolved to let it remain, in order to ſee what effect it would have on the lucern. When the lucern began to riſe in the reſt of the field, in ſpring, he found that wherever the water had ſtood, the plants were killed. He ſupplied this loſs by tranſplanting lucern from other parts; and theſe plants throve very well. By a continuance of the ſame treatment, the lucern remained in a very flouriſhing ſtate: and retained a beautiful verdure and vigour, during the very great drought of the ſummer, 1765. It has yielded four cuttings every year, and ſometimes five.

Having obſerved in a root of lucern taken up in the winter, that the ſpring ſhoots had no connection or concern with the remains of the ſhoots of the preceding ſummers, but proceeded from numbers of little tubercles, with which the head of the root was ſet very thick; it appeared evident, that the plants could not ſuſtain any damage, though covered with a depth of earth during the winter. This ſuggeſted a hint, that the intervals might be plowed as deep as poſſible early in the winter, turning the earth on the beds; and that by letting the earth remain in this condition till ſpring, the clay, or ſtrong ſoil in which the lucern grew, would be mellowed, or looſened, by the winter's froſt and rain: and being harrowed ſmooth in February, the freſh lateral roots, which ſhoot out in the ſpring, would find a fine freſh mould to extend themſelves in, which muſt tend greatly to the benefit of the plants. This thought was confirmed by experiment: for the ſpring crop is amazingly vigorous ever ſince this practice was followed, and the ſhoots though of great length, and moſt plentifully ſupplied with branches, are ſo ſtrong, that no rain or wind lays them, even when they have ſtood to be in full bloom, as is the caſe with part of the firſt crop; the horſes not being able to conſume the lucern before part of it is neceſſarily in bloom. Another advantage ariſing from this practice is, that the graſs which takes root near the plants, and which cannot be otherwiſe deſtroyed but by hand-hoeing, is killed by being ſo long covered with the earth laid on the beds.

In 1761, a ſpot of ground of an exactly ſimilar ſoil was incloſed for a kitchen-garden; and there being part of it, which was not wanted for other uſe, in the ſpring of 1762, it was ſown with lucern in broad-caſt, as a counter experiment to the former. The warmth of the garden, and the partiality of the gardener to this method, who held

held the field experiments very cheap, gave his lucern every advantage that could be desired. It came up well, and was kept free from weeds; but it neither grew so fast nor so high as the lucern sown in drills. This difference became much more sensible during the second and third years; for in 1764 the field lucern had got the start of it so far, that this did not rise to half the height, nor did it yield a quarter of the quantity of fodder; so that he thought it needless to prosecute the comparison further.

Seeing so very remarkable a difference between the lucern raised in drills, and that raised in broad-cast, he resolved to try what share of this advantage might be placed to the horse-hoe, and what to the distance at which the plants stood; which distance afforded the roots more room to extend in. With this view, in 1764, he sowed a neighbouring field in rows, two feet asunder, intending to horse-hoe one half, and to keep the other free from weeds by hand hoeing only. The months of April, May, and June, of that year, were so dry that the plants came up thin; and the clay was become so hard, that the horse-hoe could not be made use of till late in the year. Even with this disadvantage there was seen a manifest difference, in favour of the plants that were horse-hoed. The same difference was also observable in the spring of this year: but the uninterrupted drought of this summer has kept the clay so hard that the horse-hoe could not be used.

Computing the rent of the land, and the utmost expence that can attend the horse-hoeings and cuttings, it will be found, that feeding horses with lucern will be a great saving, when compared with the price of the hay and corn, which horses must have necessarily consumed in the same time, being kept to equally hard labour.

The several cultivators of lucern have each recommended some particular method of sowing and cultivating it, either in broad-cast, drilling, or by transplantation; it thrives well in all these methods, but not equally. The broad-cast is easiest to farmers, who are accustomed to sow clover and other seeds in that way, and the crops are very valuable, but inferior to both the others, in quantity and quality.

Mr. Rocque was a native of France, where they raise great quantities of lucern, and sow it broad-cast; and he recommended that method preferably to all others. At first he cut his lucern five times in the season, but afterwards recommends cutting it only three times, because he says cutting it oftener makes it bleed too much. But in this he seems to speak partially: for broad-cast lucern grows slower than the drilled or transplanted, and if allowed to grow to the proper maturity, namely till it begins to blossom, the broad-cast will commonly produce but three cuttings in England, and his produced no more, after the first or second year. His objection to drilling it, that the roots are confined in the drills, is a great mistake; for gardeners find no such ill effect in drilling; but on the contrary, they drill many of their crops by choice; and it is a fact, proved by repeated experience, that drilled lucern yields greater crops than broad cast, when both are tried upon the same land, and sown at the same time.

Mr. Rocque's method was wrong in another respect, viz. in dressing the land with fresh stable dung, which without doubt is a sure way to fill it with weeds, and should be particularly guarded against in cultivating lucern, weeds being peculiarly destructive to it, more so than almost any other crop; and for this reason dung of all kinds are very improper for lucern. Soot, ashes of all kinds, and composts of various sorts of dry manure (that contain no seeds) powdered and mixed, are excellent dressings for lucern, causing it to grow luxuriantly; and a luxuriant growth is the principal intent of manuring lucern.

Mr. Rocque, however, very properly recommends harrowing of broad-cast lucern in order to clean it; for its roots are so tough and hard, that harrowing, and even a slight ploughing, do not much hurt them; but, on the contrary, is of considerable service to the crop, by pulling up some of the shortest roots, and thinning the crop; which will be a great deal too thick, if the land is well prepared, and so much as sixteen pounds of seed is sown upon an acre. It should not be weeded with large heavy harrows the same year in which it is sown, which would pull up too many of the plants; but next year there is no danger. And the best seasons of harrowing lucern, are in spring, immediately upon the breaking of a frost; and in the summer or autumn, as soon as a crop is taken off: for at these times the ground is mellow, and the weeds are then most easily pulled up by the harrows. Some have objected to harrowing, supposing that such rough treatment would kill and wound so many of the plants, that the lucern must be of short duration: but experience has shewn this to be an error, and that where the harrowing has been performed with proper care, the broad-cast crops in England, have continued to flourish for fifteen or sixteen years, whereof Mr. Young has mentioned some examples in his north tour, and some have lasted almost as long in Surry: which are great encouragements to farmers to raise this valuable plant in the broad-cast way.

It must, however, be acknowledged, that drilling the seed is a much better way than sowing it broad-cast, and of obtaining better crops; this may be done by close drilling the seed, in rows six or seven inches asunder, and the crops cleaned by harrowing; but better if the rows are two feet or more distant, to be thinned in the rows, and set out to the distance of two or three inches, and the spaces between the rows cleaned of weeds by a cultivator, which will at the same time improve the crops and the land; and in this way the crops are superior to the broad-cast, or close drilled, and is a method of culture very easily performed. But to those who would practise an accurate and spirited husbandry, the very best method of cultivating lucern is upon ridges. M. de Chateauvieux in this way obtained above five tons of lucern hay per English acre, reckoning his crops at an average of four years; and it is remarkable that his crops were improving, though they had no manure, and only hoed with his cultivators; the crop was greatest the fourth year, being at the rate of seven tons and a half of hay per acre. His ridges were a little more than three feet broad, and a single row of plants upon each ridge, and six inches distant.

When lucern is transplanted upon ridges, the roots are shortened to six or seven inches, and the tops to two inches. Cutting the tap roots makes it throw out many lateral roots, which spread near the surface of the ground, where they enjoy the warm influence of the sun, causing the plants to shoot quick, and produce more cuttings in the season, than if the tap roots descended deep into moist cold ground. This is an advantage that the broad-cast

lucern cannot have; but the drilled may, thought not transplanted: for by ploughing the earth from one side of the rows, the tap roots are easily come at, and may be cut with a long sharp knife in October, without endangering the plants, or checking their growth.

M. Duhamel had forty tons of green lucern upon an English acre, which he computes at ten tons of hay; by which it seems that his lucern was full blown before he cut it: for then it does not lose so much of its weight in drying, as if it was cut before it blossomed: for forty ton cut just before it begins to blossom, will waste to about eight ton, in drying to hay: but it should be always cut before it blossoms, as it is then in perfection. It was cut four or five times in the season by these gentlemen, and produces as many cuttings here, and in some summers more. Mr. Donnellon, at Artane near Dublin, who had long cultivated lucern, writes, "that good lucern the second year should yield three pounds and an half to a square yard, and says I have frequently had it so. I cut some drilled, and some in the random way in August, both sown the April before; the drilled weighed one pound and a quarter, the square yard; the other not half as much. Thorough saved hay made of it is not above a fifth of the weight when it is cut." He cut his lucern four or five time in the season; and the produce, in the above proportion, was six tons of hay per English acre, at four cuttings; and at five cuttings, above seven tons and a half per English acre. This lucern was planted upon three feet ridges.

Planting it upon ridges is the best method of all; but if the ridges are only three feet broad, and the plants six inches distant in the row, the bulbs, or crown of the roots spread, and in two or three years they meet, and form a row of six inches broad on the middle of each ridge; and then there is not room to horse-hoe them properly, nor earth enough to be hoed: for this reason it is better to set the plants at nine inches distance in the rows, and to make the ridges four and a half or five feet broad. The heads of the plants will soon spread and meet, (for they have been known to spread to a foot or eighteen inches diameter, where they had room, and good nourishment:) and when they meet, will form a broad row upon each ridge, of nine inches; and will produce four, five, or six cuttings in the summer, in quantity proportionable to their breadth, and the culture bestowed upon them: and as three feet ridges, and plants six inches distant, have produced above five tons of hay every year, without manure, these well hoed and manured, may be expected to yield eight tons of hay every year: for lucern is cut as often, and yields as great crops in England, as in France or Italy. These would produce still greater crops, if allowed more room, which the curious will find upon trial. One great advantage of cultivating lucern in this manner is, that there is not a weed among such lucern, and the stalks are rich and succulent, incomparably nourishing food for cattle, and for soiling horses superior to any of the cultivated grasses.

That the thick sowing of lucern-seed very much lessens the crops, appears very clearly from Mr. Wynn Baker's experiments upon this plant. He sowed some lucern seed in 1764, in drills one, two, and three feet distant, and in broad-cast all upon the same ground; and he transplanted some of this lucern at one year old from seed; at the same time shortening the roots to six or seven inches, and the tops to about two inches, as practised by M. de Chateauvieux. The lucern of these several experiments, growing upon equal quantities of land, were cut all at the same time, and the products were per Irish plantation acre, as follows:

	The three feet drills. Produced.				Two feet drills.				One foot drills.				Broad-cast.				Transplanted.			
	Ton.	cwt.	qr.	lb.	Ton.	cwt.	qr.	lb.	Ton.	cwt.	qr.	lb.	Ton.	cwt.	qr.	lb.	Ton.	cwt.	qr.	lb.
1st year, 1764	2	4	2	16	3	3	2	8	2	12	2	0	4	4	1	4	Not cut by mistake			
2d year, 1765	8	17	0	16	9	10	0	0	8	17	0	16	8	2	3	12	10	12	3	12
3d year, 1766	32	0	2	24	29	10	0	0	31	0	0	0	16	2	3	8	34	12	2	10

This lucern yielded but four cuttings in the year, the land being cold and poor, and lying upon a bed of stone, and but about six inches deep above the stone quarry. It had no manure. The three feet drills, and the transplanted were hoed with a small plough: the two and one feet were hand-hoed, and the broad-cast was cleaned with a rake.

Here it is observable, that the broad-cast yielded the largest crop the first year; but continued to decline the following years greatly. And the three feet, and the transplanted were also gaining upon the narrower drills, though the narrow had many more plants in them: for none of the rows were thinned; so that the one foot drills had thrice as many plants in them, as the three feet drills, and yet produced a smaller crop, viz. the one foot drills produced but thirty-one tons the third year, and the other produced thirty-four tons and a half. But the most remarkable difference is in the one feet drills and the transplanted; this last having only two plants in a foot long of the row, and the other probably more than ten times as many; yet these ten produced not half the crop of the thin plants: but the broad-cast, which was sown thick all over the ground, produced the smallest crop of all; a plain proof that thick sowing diminishes the crops to a very great degree. It also very much lessens the value of the crops; the large plants are by much the most succulent, weighty, and nourishing, and are entirely free from weeds; but the broad has always many weeds, which are a considerable part of the crops.

Clayey or strong land retains much moisture, which makes such land cold, and the crops raised upon it late, and for this reason, though lucern will grow upon strong land, mellow loams are the most proper for it, a warm aspect, and the land laid in ridges, well manured, and frequently hoed; with these advantages it will yield surprising great crops, which it is very capable of producing. In 1765, Mr. Baker observing one of his plants of lucern, which he had transplanted the year before, was very vigorous, he cut it by itself, and it weighed twenty-seven ounces, which at six plants per yard square, is ten pound two ounces per yard, or thirty-five ton, eight cwt. of green lucern upon a plantation acre, at one cutting. He says he knew of no extraordinary advantages,

tages which this plant had, unleſs any accidental quantity of manure had dropped near it. At four cuttings, an acre of ſuch plants would produce one hundred and forty-one ton twelve cwt. of green lucern in one ſummer, or twenty-eight ton ſix cwt. of hay upon one plantation acre (ſeventeen ton, fourteen cwt. of hay per Engliſh acre) the ſecond year after it was tranſplanted.

He further obſerves, that his lucern was not in general ready to be cut till May every year, and produced but four cuttings in the ſeaſon, but that having tranſplanted half an acre of lucern, upon land that had a better aſpect, (than that of his other experiments) this half acre lying to the ſouth-eaſt, had ſuch effect, that though this ſoil was rather inferior, the lucern upon it was from ten to fourteen inches high, the 27th of March 1767, its ſecond year from tranſplantation, and his other lucern was then but ſix inches high.

Lucern not only produces great crops, but they are alſo highly nouriſhing to cattle, more ſo than any of the other graſſes, or than any of the plants or roots commonly given to them, as will appear from experiments, thoſe particularly that have been made by the ſame accurate experimenter.

He bailed up two of his largeſt milch cows, and fed them a month with green lucern only; and found, that each of theſe cows eat eighty-four pounds of the lucern in twenty-four hours, without waſte: if he gave them more they made waſte. They gave a great quantity of exceeding good milk, and of a good flavour, equal in quality to that from two other cows fed at the ſame time upon a choice ſmall meadow. Butter was likewiſe made from the lucern and the meadow, which were both excellent, and of equal goodneſs. The cows were ſwelled by eating the lucern, if given them immediately after it was cut; but not if they were fed upon what was cut the preceding day.

Mr. Baker alſo fed his cattle upon turnips, cabbages, and turnep-cabbages, and found, that a fatting bullock eat a day nearly half his beef weight of turneps, and ſeven pounds of hay; and of cabbages, and turnep cabbages, three-eighths of their beef weight a day, beſides ſeven pounds of hay: when fed upon turneps they refuſed water, but drank ſome with the cabbages. The two milch cows fed upon lucern as mentioned above, he ſays were two of the largeſt he had, and therefore weighed probably between four and five hundred; but admitting they were only four hundred each; and that a fatting bullock of that weight, would eat as much lucern as each of them, viz. eighty-four pounds a day, the daily proportion of theſe three kinds of food, neceſſary for a bullock of four hundred weight is as follows:

A fatting bullock of	4	cwt. will conſume every day,						
Of turnips —	2	cwt. or $\frac{1}{2}$	his beef weight, and ſome hay	—	—	—	$\frac{4}{8}$
Of cabbages —	$1\frac{1}{2}$	cwt. or $\frac{3}{8}$	of ditto, and ditto	—	—	—	$\frac{3}{8}$
Of lucern —	$0\frac{3}{4}$	cwt. or $\frac{3}{16}$	ditto, and no hay	—	—	—	$\frac{3}{16}$

By which it appears, that lucern goes above twice as far as cabbages in feeding bullocks, and ſtill further than turnips.

If the value of theſe crops are eſtimated in proportion to their produce per acre, an acre of good turnips weighs from twenty to thirty tons, the laſt is a great crop, and ſeldom obtained by farmers in the way of hand-hoeing. Mr. Young, indeed, ſpeaks of fifty tons of turnips produced upon an acre, and in that proportion throughout a whole field, but does not mention by what culture, hand or horſe-hoed; and there is no doubt, if we compute from the ſize or weight of very large turnips, an acre may produce that quantity; but certainly in common practice, the crops are rarely ſo high as thirty tons; and twenty tons may be reckoned the full average of good crops.

Of cabbages the Scotch are the largeſt hitherto introduced into common culture, and the weight of them is ſometimes as high as forty pounds a piece; but the beſt crops to only about fifty tons per acre, and the average from twenty to forty tons per acre.

Good crops of green lucern may be reckoned from twenty to forty tons, and the average about twenty-five tons per acre, when drilled on the level; but conſiderably more if upon ridges, and horſe-hoed.

A bullock may be well fattened upon lucern in four months, or, allowing twenty weeks to fatten him upon turnips, cabbages or lucern, he will in that time conſume of theſe ſorts of food, in the proportions above mentioned, admitting him to weigh four hundred when fat, the quantities following.

					Cwt.	Cwt.	Ton.	cwt.	lb.
Of turnips, in twenty weeks,	at	2	a day	(beſides $8\frac{3}{4}$ of hay)	—		14	0	0
Of cabbages, in ditto, —	at	$1\frac{1}{2}$	a day	(and $8\frac{3}{4}$ of ditto)	—		10	10	0
Of lucern, in ditto, ——	at	$0\frac{3}{4}$	a day	(no hay neceſſary)	—	—	5	5	0

An acre of each of theſe will fatten,

Turnips,	25 ton per acre will fatten, with hay near	2	ſuch bullocks.
Cabbages,	30 ton per ditto, ditto, with hay, near	3	ditto.
Lucern,	25 ton per ditto, ditto, without hay, near	5	ditto.

All which ſhew plainly, the ſuperiority of lucern to turnips and cabbages, when compared together, either by weight, or by the acre.

Carrots are a very nouriſhing and hearty kind of food, for all ſorts of cattle, and are by ſome ſo highly eſteemed, that they may perhaps be thought equal or ſuperior to lucern: but as there are few accurate experiments made of feeding black cattle with them in the comparative way, the value of them cannot be aſcertained exactly. The large experiment made by Mr. Billing is not fully ſatisfactory in this point: for he ſtates his crop, and the application of it in feeding cattle, by the load; but does not mention the weight of his loads, or the weight per acre; which renders the experiment obſcure.

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Fig. 1.

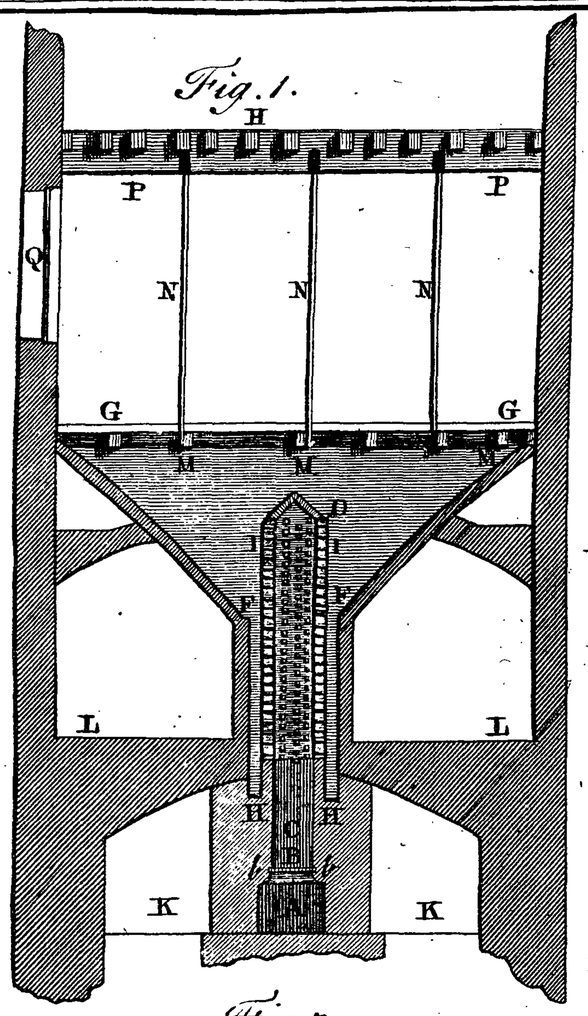


Fig. 2.

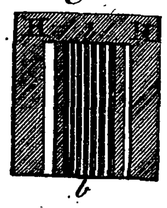


Fig. 3.

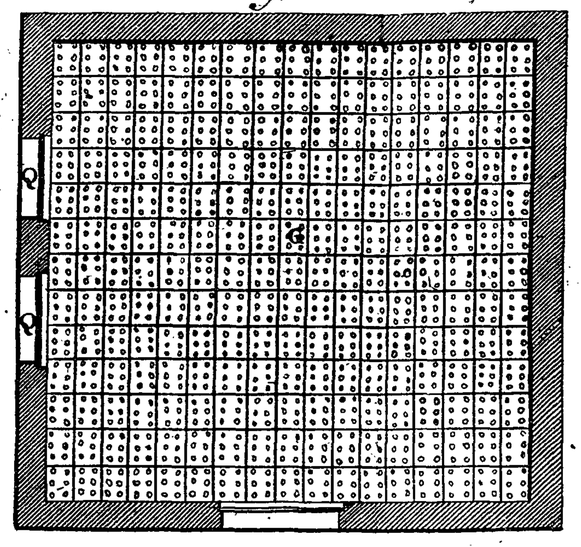


Fig. 4.

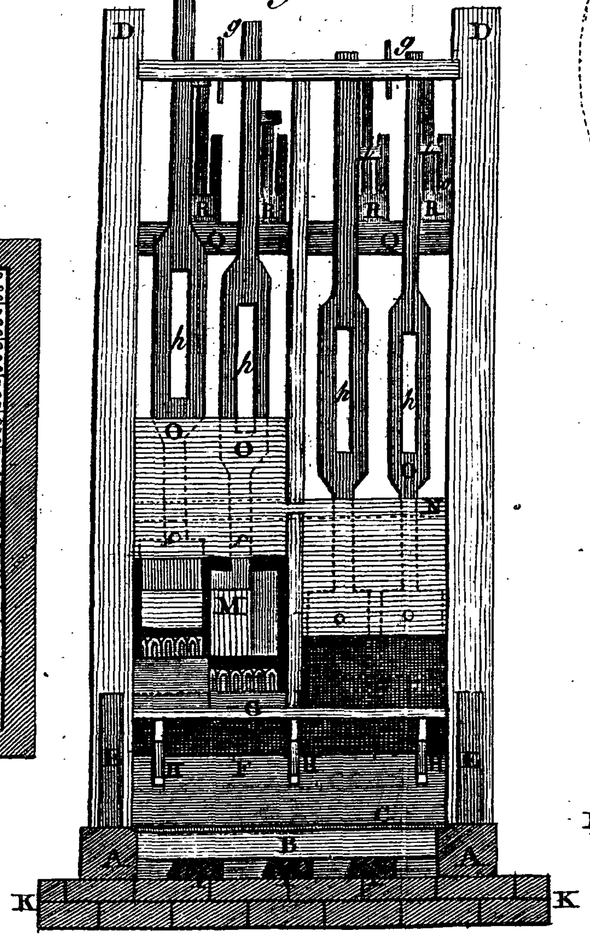


Fig. 5.

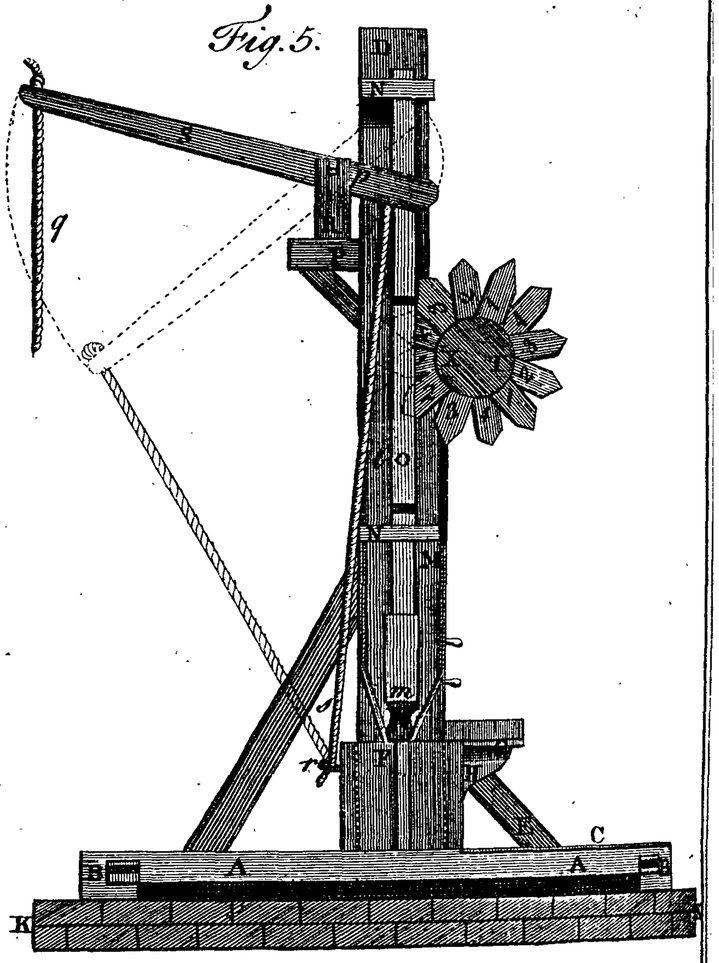


Fig. 7.

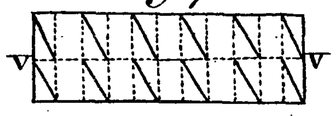


Fig. 8.

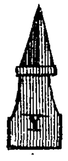
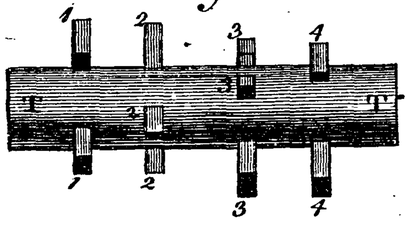


Fig. 6.



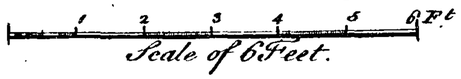




Fig.2.

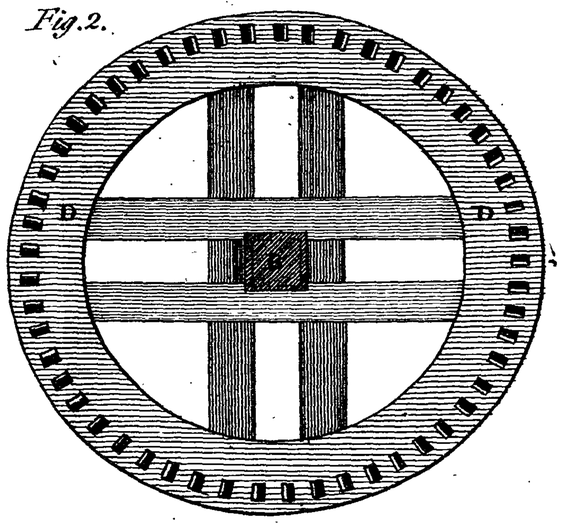


Fig.5.

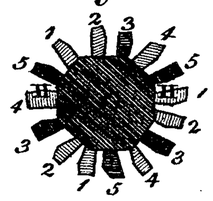


Fig.4.

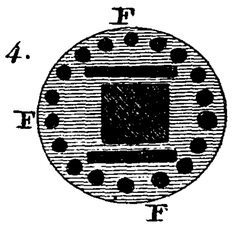


Fig.6.

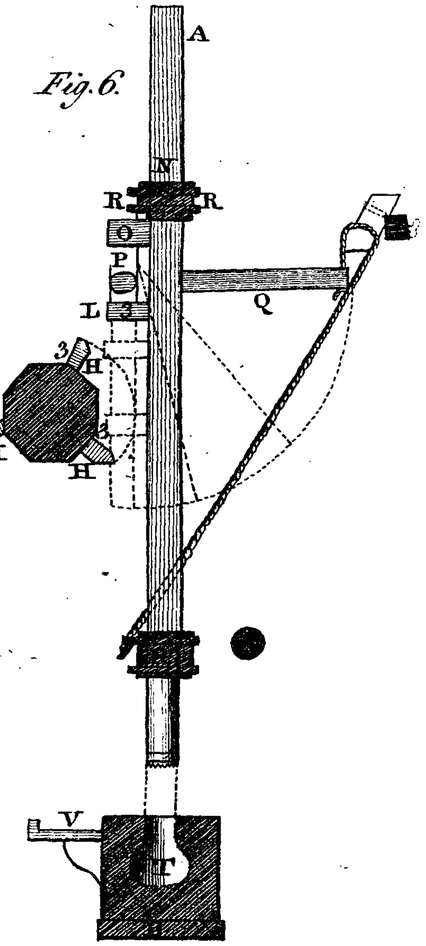
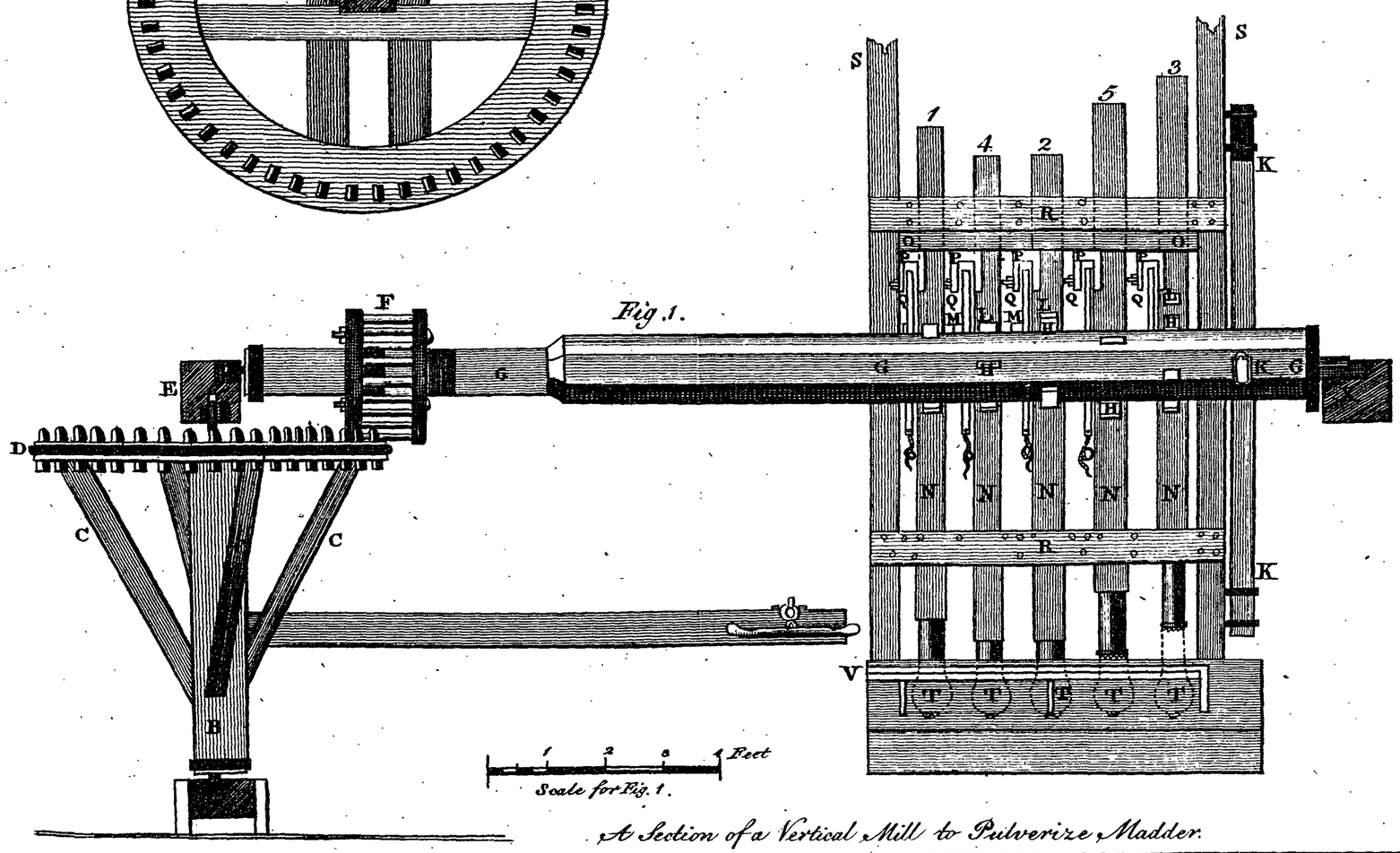
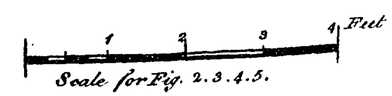


Fig.3.

Fig.1.





A Section of a Vertical Mill to Pulverize Madder.

We may, however, from what he ſays of his carrots, approach nearly to their feeding quality. His $30\frac{1}{2}$ acres ſown with carrot ſeed, produced in all 510 loads of carrots, which is about $16\frac{1}{4}$ loads per acre, upon an average. He had long experience of fattening cattle with turnips, and in uſing his carrots found that one load of them was nearly equal in feeding to two load of turnips, and probably the loads of theſe two were of nearly equal weight. Now as it appears above, that $\frac{3}{16}$ of lucern goes as far in feeding as $\frac{8}{16}$ of turnips, the lucern is $\frac{5}{16}$ more feeding than turnips, and conſequently than $\frac{4}{16}$ of carrots; and therefore lucern is ſuperior to carrots in the proportion of 4 to 3: but by the acre the ſuperiority is ſtill greater: for an acre of land will produce twice the weight of green lucern, as of carrots.

Mr. Baker fattened ſheep upon turnips, cabbages, and turnip cabbages. His ſheep when fat weighed about 80 pounds each, and they eat daily of

Turnips, 20 pounds, or $\frac{1}{4}$ of their mutton weight.

Cabbages and turnip cabbages } 15 pounds, or $\frac{3}{16}$ of their mutton wt.

By this it appears that ſheep eat but half the quantity a day that bullocks do in proportion to their weight: ſo that if ſheep can be fattened in as ſhort time as bullocks, fattening ſheep is by much the moſt profitable: for the price of mutton and beef at market is much the ſame in general, and mutton is frequently deareſt.

LUG, *or* LUGG, the ſame with pole, or perch, a long meaſure of ſixteen feet and a half.

LUPINES, a ſpecies of wild pea, cultivated principally as a manure.

Lupines require the leaſt labour of any thing that is ſown; and it will thrive in any ſoil, except the chalky and miry; but delights particularly in poor, hungry, worn out land, eſpecially if it be dry and ſandy. If ſown in February or March, after a ſingle very ſhallow ploughing, and ſlightly harrowed in, or even harrowed in without any ploughing, it will bloſſom three times between May and Auguſt, and prove an excellent enricher of the ground when ploughed in juſt after its ſecond blooming: though Mr. Miller, holding the lupine to be a very great impoveriſher of the ground whilſt it grows, thinks it is ſtill better to parboil the ſeeds, to prevent their ſprouting, and then to ſtrew about ſixteen buſhels of them upon an acre of land and plough them in. In warm countries, lupines are much ſown in vineyards for this purpoſe only, and are found to be one of the beſt manures that can be laid to the roots of the vines. Their ſeeds ripen towards the end of September, or in the beginning of October. They are very bitter: to remedy which, the Spaniards and Italians, who feed their cattle, horſes not excepted, with them in winter, ſteep them in river water and ſalt, till that bitterneſs is gone, and afterwards dry them thoroughly over a fire or in the ſun. They even make bread of them, when corn is very ſcarce, and put them to ſeveral other culinary uſes. The beſt time for mowing them is after a ſhower of rain, becauſe the ſeeds drop eaſily out of their pods when they are gathered too dry. They muſt, however, be laid up very dry, or worms will ſoon breed in them. The red and the blue lupines, which are frequently planted in our gardens by way of ornament, grow wild, and in great quantities, about Madrid.

LYE, a fluid impregnated with ſalts, &c. *See the article* STEEPS.

LYNCHETS, or *Linchets*, graſs partitions in arable fields.

M.

MADDER, the Engliſh name of a plant, cultivated with great advantage in ſeveral parts of Europe, and lately in England, being a very capital ingredient in the dying buſineſs.

There are ſeveral ſpecies of madder, all of which afford a dye. M. Guettard, of the Royal accademy of Sciences, has experienced that the ladies bed-ſtraw, or cheeſe-rennet (gallium) may be made to yield one; and of this kind is probably the Ray-de-chaye, which is uſed on the coaſt of Coromandel for dying red. M. Dambourney has not, indeed, as M. Duhamel remarks, hitherto been able to extract a good colour from the gallium: but there yet remains room to hope he may be more ſucceſsful in the future experiments which he intends to make on this root.

Mr. Ray mentions and deſcribes four different kinds of gallium or mollugo, baſtard madder, which, after the laudable example of our enterprizing neighbours, ſhould likewiſe afford matter of experiment to thoſe who wiſh well to this country, and particularly to our dyers.

The azala or izari of Smyrna, perhaps more properly written hazala or lizary (according to the eaſtern method of pronunciation) which is the ſort uſed by the French dyers at Darnetal and Aubenas, to give cotton that fine carnation colour for which Adrianople is famed, is a true madder. Some ſpecies of it grow naturally under hedges and in woods; and the roots of theſe, when carefully dried, yield as fine a dye as the azala of Smyrna. M. Dambourney has cultivated a ſpecies of madder which was found growing wild on the rocks of Oiſſel in Normandy, and the roots of this plant have yielded him as beautiful a dye as the azala of the Eaſt. We ſhall hereafter ſpeak of it in his own words: but in the mean time we cannot help obſerving here, that Mr. Ray deſcribes particularly a wild madder which grows not only on the St. Vincent's rock near Briſtol, but alſo on the rocks about Biddeford in Devonſhire, and in great plenty among the hedges almoſt all over that country. As Mr. Ray calls this the *Rubia ſylveſtris monſpeſſulana major*, and as M. Duhamel ſuſpects M. Dambourney's Oiſſel madder to be that very ſpecies, it ſurely is a matter of great importance to this nation, and well worth the attention of patriots, to follow M. Dambourney's example in making proper trials of it.

The ſpecies moſt commonly cultivated is the *Rubia tinctorum ſativa*. J. B. III. 2.714. and C. B. Pin. 333, commonly known among us by the general name of madder. It is of this ſpecies that the plantations of madder are made in Zealand, and in the neighbourhood of Liſle.

The following method of cultivating this uſeful plant was ſent to the editors of the Muſeum Ruſticum, by a gentleman who has been a practical grower of madder for ſeveral years, and tried it upon land of various kinds.

My firſt trial, ſays he, was upon a ſmall piece of ground near my houſe, of about forty perches of land, lying pretty low and moiſt, of a deep mellow ſoil, and rich black mould, a little inclining to ſandy; and underneath about two feet and a half, and in ſome places three feet of good earth, was a bed of looſe ſand, with a mixture of gravel.

I have been the more particular in the deſcription of the nature of this land, becauſe it produced the beſt Engliſh madder I ever had, both as to quality and quanty.

In March I cauſed this plot to be dug a full ſpit deep; and as it was under natural graſs for ſome years before, I took care in digging to throw the top turf as low as poſſible, turning the mold uppermoſt, in order to prevent the graſs from ſpringing; which had the deſired effect. I alſo took care to throw out all the roots of weeds, and other noxious plants, which were found therein.

In this ſtate it remained about a month; then with a line I divided it into beds five feet wide, and two feet interval between each bed, raiſing them a little in the middle with ſome of the earth in the intervals; then with iron rakes the beds were reduced to a fine garden mould, leaving them a little rounding, like aſparagus beds, in order to ſhoot off the rain-water; and having procured ſome ſtrong packthread, at every foot diſtance I tied a ſmall piece of white woollen-yarn, and thus continued the whole length of the line, which afterwards ſerved as a rule where to fix the plants.

This line was extended, the whole length, upon the outermoſt bed, ſix inches from the ſide ridge of it; then with iron-ſhod dibbles a madder-plant was ſet ſtrong in the ground, near every tuft of white yarn fixed along upon the line.

This row being thus planted, the line was removed two feet forwards, which brought it exactly to the middle of the bed: this being alſo finiſhed, the line was again removed two feet, and planted as before; and this method I continued till the whole was planted. Thus there were three rows of plants in each bed, at two feet diſtance, and one foot apart in the rows; and the diſtance between the innermoſt row of one bed, and the outermoſt row of the next adjoining bed, was three feet.

During the firſt ſummer I kept the young madder quite clear from weeds, by hand-hoeing, as ſoon as any appeared: and in October following I took the haulm, that over-ran the intervals, and ſpread it over the beds, without cutting any off; then with a ſpade I covered the haulm with the earth from the intervals about two inches thick.

In this condition it remained during the winter, and in March following, the young madder came up very thick and ſtrong; and as faſt as any weeds appeared, I kept them down by hoeing as before; but in the ſecond ſummer I found there was no neceſſity of repeating the hoeing after the middle of June, for the haulm was now grown ſo very luxuriant as entirely to cover the ſurface of the ground, and thereby prevented the weeds from growing; and in October I again ſpread the haulm upon the beds, and covered it over with the earth in the intervals, as before.

There are three good reaſons for covering the madder in winter.

The firſt is the new dreſſing of the beds with freſh untried earth.

Secondly, by this method deep trenches are formed at proper diſtances throughout the whole plantation, and conſequently the beds are kept dry and healthy, and thereby the roots are prevented from rotting, which otherwiſe they are apt to do, if the water continues too long ſoaking on the beds.

The third reaſon is ſtill more efficacious; for by this means the haulm is entirely rotted, and the volatile ſalts contained therein are waſhed down to the roots by the winter rains, which tend more to encreaſe the vegetation of the plants than double the quantity of any other ſort of manure whatſoever, and for this reaſon, becauſe the ſalt, inherent in the haulm, is of the ſame kind with that which was before extracted out of the ground by the growing of the madder, and is now returned into the earth again, in order to renew its former office of vegetation.

This, perhaps, may ſeem new doctrine to moſt of your readers; but experience convinces me of the truth of it, not only with regard to madder, but likewiſe in the propagation of aſparagus, which, in a future letter, I may, if I have leiſure, explain more fully, by giving the public an account of my making and managing thoſe beds.

If this hint was duly attended to, it is my opinion that both farmers and gardeners would find their account in it in the production of moſt ſorts of vegetables.

But to return more immediately to my ſubject.

In the third ſummer very little work was required, only two ſlight hoeings in April and May, owing to the ſtrength of the haulm, which covered the ground as in the preceding ſummer; and in October following the roots were taken up, and this ſmall piece of ground produced one thouſand nine hundred and ſixty-five pounds of green roots, which were very large, and the madder, upon trial, found to be exceeding good.

In cultivating madder, great care is to be taken to ſee that every ſet or plant has ſome ſmall fibres at the root; and this ought particularly to be obſerved by thoſe who are employed in taking them out of the ground; for unſkilful perſons, not uſed to the buſineſs, very often draw up ſuch as have no fibres at all, and then they certainly miſcarry.

The beſt way is, to remove the earth from the mother plant with a ſmall hand-hoe, or ſome ſuch inſtrument; and then you may eaſily find which of the young plants has fibres, and which not.

In the ſecond ſpring you muſt be cautious not to take off above two or three ſets from each root; but in the third ſpring, when they are deeply rooted, you may take off almoſt as many as you pleaſe, without injury.

The ſooner the young plants are ſet after they are taken up the better; and if you are obliged to have them at a diſtance, ſo that they cannot be ſet again in leſs than three or four days after they are taken up, they muſt be well watered at firſt planting, and repeated as often as you ſee occaſion, till they have taken root.

In dry ſeaſons, the young plants very often die for want of moiſture ſoon after they are planted; and in large plantations the expence of watering would be too great; therefore I always get my land ready early in the ſpring, and wait for ſome ſhowers falling; and when I find them juſt at hand, and ſometimes in the rain, I get a great many hands, and immediately go to work, ſome taking up, and others raking and planting; ſo that the whole is ſoon finiſhed, even in a large piece of ground; and when the plants are well watered at firſt, they ſoon take root, and afterwards they will ſtand a dry ſummer very well.

In the moſt favourable ſeaſons, ſome few plants always die ſoon after they are ſet; therefore about three weeks after planting, you muſt go over your madder-ground, and replace ſuch as have failed, with the beſt and moſt likely plants; and if the ſeaſon be dry, let them be well watered at firſt planting; but, if after all, you find any miſcarry, (which, in a dry ſummer, they ſometimes will do) the beſt way is to fill up the vacancies with winter-plants in October following, juſt before you cover the haulm.

Madder may be ſucceſsfully planted from the middle of March to the end of May, according as the ſpring is either forward or otherwiſe; but if ſhowers ſhould happen to fall in April, this is the beſt month in the year for planting madder. There ſhould be no dung of any kind laid upon the ground during the time the madder is growing, becauſe it has been found to give the madder a bad colour; and if the land is in good heart, and proper for the purpoſe, there will be no need of it.

It cannot be expected that any land, even the richeſt, ſhould produce repeated crops of madder; for which reaſon, I am told, that the Dutch always allow an interval of ſix or ſeven years, in which time they manure the land very well, and ſow it with corn or garden vegetables, and have always large crops, owing to the deep ſtirring of the ground, and being clean from weeds; and I can, from my own experience, aſſert, that the beſt crops of corn always ſucceeded a madder-crop.

About five years ago, I planted an acre of madder on a light, dry, ſandy ſoil, which produced a tolerable crop, but nothing equal to the other.

I likewiſe tried it upon an acre of land of a loamy mellow ſoil, ſomewhat ſandy, about a foot deep in mould; and underneath it a cold, ſtiff clay: from this piece I had great expectations, as the plants thrived very well at firſt, but in the ſecond ſummer when the roots reached the clay, the plants died away, and came to nothing; therefore I am well ſatisfied a cold clay is by no means proper for madder.

I have alſo, at this time, two other acres of madder, which I intend to take up next winter; it will then have ſtood three ſummers. The ſoil is a deep, hazel mould, worth about twenty ſhillings per acre. Inſtead of digging it with a ſpade, I plough-trenched it at leaſt eighteen inches deep, but managed, in all other reſpects, like the former. From the appearance it made laſt ſummer, I have no great expectations from this plantation, though, I fancy, it will be a ſaving crop.

Expences attending the Culture of an Acre of Madder, ſuppoſing the Land to be worth forty Shillings per Acre.

	l.	s	d.
Rent for three years — — —	6	0	0
Digging ditto at two-pence per perch —	1	6	8
Dividing ditto into beds, two men one day, at one ſhilling each — —	0	2	0
Raking ditto, two men one day, at one ſhilling each — — —	0	2	0
Planting ditto with two thouſand plants, one day, at one ſhilling and ſixpence each	0	3	0
Six women to take up two thouſand ditto, at ſixpence each, one day — —	0	3	0
Hoeing the firſt ſummer five times —	0	15	0
Covering ditto in autumn the firſt year	0	6	0
Hoeing ditto the ſecond ſummer three times	0	9	0
Covering ditto in autumn the ſecond year	0	6	0
Hoeing ditto the third ſummer twice —	0	4	6
To be paid in lieu of tythe, at five ſhillings per acre per annum — —	0	15	0
Digging ditto out of the ground —	5	0	0
Total of expences	15	12	2
As I always allow my people beer when they are about this buſineſs, I may add	0	6	0
Which brings the whole expence to	15	18	2

In the above account I have not reckoned any thing for the plants; for though they coſt conſiderably at firſt, yet it is then done once for all to any perſon who continues to propagate madder, as he has always a conſtant ſupply from his own plantations.

	l.	s.	d.
Produce of an acre of madder —	52	12	2
Expences — — —	15	18	2
Clear profit — — — —	36	4	4

In the buſineſs I follow, which is that of a clothier, a great deal of madder is uſed in dying; and being of opinion that there are many uſeful diſcoveries now lying dormant, only for want of proper methods to bring them to light, I determined to try an experiment on madder; accordingly I took twenty pounds of the green root, and having waſhed it clean from dirt and filth, I bruiſed it in a large iron mortar, juſt before uſing, and with other ingredients I dyed half a pack of wool of a dark, full drab: upon examining my colour, I found it full as good as tho' I had uſed four pounds of the beſt umbro madder, imported from Holland; ſo that according to this calculation which is founded on experiment, five pound of green madder-root is equal to one pound of dry manufactured madder: and as I have found this method to anſwer I have continued to uſe the root in this condition ever ſince, and find it much the beſt and cheapeſt way; for the green root is bruiſed very eaſily in the mortar, and thereby ſaves a great expence in drying, pounding, &c.

Before I quit this ſubject, I would adviſe thoſe perſons who are inclined to cultivate madder, to be very cautious in the choice of land for this purpoſe; for hereon their ſucceſs chiefly depends. Madder being a plant that draws a great deal of nouriſhment, conſequently the richeſt and deepeſt lands are to be choſen, and ſuch as lie pretty low; for high lands are ſeldom fertile.

The following method of cultivating madder was communicated to the public by M. de Salens, a French gentleman who is well acquainted with this branch of huſbandry.

I am apt to think, ſays he, there is hardly any kind of ſoil, but what madder will grow in; but it does not thrive alike in all: on the contrary, ſcarcely any plant ſooner diſcovers the richneſs, or poverty of the land, by the ſtate of its growth, than madder: in rich land, and a ſoil that agrees with it, it is luxuriant, and produces a great number of ſizeable, well conditioned roots; but in a poor, dry, hungry ſoil, the plant is viſibly checked in its growth, and the roots of it are ſmall and few in number.

Madder is a great friend to moiſture, and therefore thrives beſt on a good loam, with a clay bottom. It is very fond of freſh land juſt broke up; but it muſt be ſo ſituated as not to be ſubject to be overflowed, as that will deſtroy the plant.

Madder requires, to come to a ſtate of perfection, a great deal of nouriſhment; yet it is ſaid not to impoveriſh the land; and this, in fact, is evident; for when the madder is dug up, the earth will be in excellent condition to bear a good crop of wheat.

I have tried ſeveral ways, and at length am of opinion, that the beſt method of raiſing madder in France, is from the ſeed: it occaſions, indeed, at firſt, ſome delay; but by continuing to ſow a quantity in the nurſery every ſpring, you will never fail to have plenty of plants.

The ſeed muſt be ſown on a bed of earth, dug well, and made very fine with the rake, with which inſtrument the ſeed muſt be ſlightly covered.

When the plants appear, they muſt be carefully weeded, and ſet out with a hoe: the bed muſt, during the whole firſt and ſecond ſummer, be kept very well hoed, and clear of weeds; and if this is done, they may be planted out the ſecond autumn.

I have many reaſons for preferring this method in France; but I ſhall forbear giving a detail of them, becauſe my opinion with reſpect to planting madder in England, is different.

The ſeed of madder does not ripen ſo well with you, as with us; neither does it, as I have been informed, take ſo well on being ſown. For theſe reaſons, I would recommend it to you, to make your plantation with ſhoots that are put forth by the old roots in ſpring. I have practiſed this method, and met with ſucceſs.

For madder to ſucceed well, there ſhould be a great depth of good ſoil, and it ſhould be turned up very deep with a plough, or, what is much to be preferred, with a ſpade. When the ground is properly prepared, it ſhould be planted with ſets, being the ſpring ſhoots pulled up in a madder-plot, with ſome root to them; for, if they have not ſome root and fibres, they will not take kindly: theſe ſhoots generally come from the layers of the plants, and great care ſhould be had in taking them up, or the crop of madder will be damaged: the beſt way of doing it is with a dibble that has a flat edge ſhod with iron; this, on being thruſt into the gronnd, cuts off the roots at a proper length, and by gently declining the handle of the dibble, raiſes the ſet, without injuring the fibres of the root; and great care ſhould be taken not to take up too many of theſe ſhoots or ſtalks, as they are undoubtedly neceſſary to the ſupport and thriving of the principal roots, which, were they deprived entirely of their ſtalks, would certainly periſh.

It is ſcarcely neceſſary to inform you, that as faſt as theſe ſets are taken up they ſhould be immediately replanted.

To make the method of planting theſe ſets more intelligible to you, I muſt obſerve, that they are planted nearly as potatoes are planted in Ireland; that is, a ſtraight furrow is drawn, the ſets are put into it, the earth of the ſecond furrow is thrown over them, the ſecond furrow is filled up with ſets, &c. and ſo on till the whole ground is planted.

We place the ſets here within three inches of each other; but this I think is too near for good land: perhaps they would thrive better, was double the ſpace allowed: when three rows are planted a foot aſunder, we leave an interval of four or five feet, according to the ſtate of the land.

Grounds planted with madder, always ſucceed beſt when gentle rains fall ſoon after the work is done, as the ſets take root the readier, and the whole gets into a thriving ſtate.

In Holland and Flanders, this method of planting differs from that above deſcribed: they take up their ſets from an older madder ground in May, and they plant them again immediately with a dibble, about three inches aſunder, in rows about fifteen inches from each other; they form their beds about ten feet wide, and leave intervals of only one foot and a half or thereabout.

The beſt time of planting a madder-ground is undoubtedly in autumn, as the ſets are then beſt furniſhed with roots, and the rain, which commonly falls at that ſeaſon, forward their growth.

As the ſtalks of the madder-plants are to be laid down and covered with earth, the intervals ſhould be every now and then ſtirred to keep the ſoil looſe. This covering is done when the ſtalks are about fourteen or fifteen inches long: after the ground has been well cleared of weeds, a part of the ſhoots in each row is laid down in the intervals on the looſe earth, and ſlightly covered with the ſame earth; obſerving, however, not to cover them entirely: the end of each ſhoot ſhould be left out of the ground, or they will not grow, and the whole work would be thrown away. The intention of laying theſe ſhoots down is, that they may be converted into roots, and thereby increaſe the quantity for ſale; but all the ſhoots ſhould not be laid down, or the diſproportion betwixt the ſtalks and the roots would be too great.

This work may be done with great eaſe with the common implements, let a furrow be opened cloſe to each ſide of the bed with a plough: in theſe the ſhoots are laid down, and covered ſlightly with a hoe.

None of the ſtalks of the madder ſhould be pulled up the firſt year, as it will too much weaken the roots by diſturbing them, and tearing off their fibres.

After laying down the ſhoots the firſt year, the madder ground requires no farther care, except being kept clear of weeds; and in the autumn of the ſucceeding year it may be taken up, in order to its being prepared for ſale: the earth of the intervals muſt always be kept looſe by tillage.

When the madder-roots are taken up, the whole land gets a thorough ploughing, and ſome freſh roots or ſets are regularly planted in rows, in the intervals of the former year; and when this ſecond crop of madder is off, the land will be in fine condition to bear excellent crops of corn; for madder is no impoveriſher of land, and the frequent tillage it requires, brings the land into fine tilth, reducing it into as ſmall particles as the bed of a well-kept garden.

The beſt huſbandry is, not to plant the ſame land in madder for many years afterwards: and whenever it is again planted with that crop, it ſhould be well dunged, manured, and tilled the preceding year.

When the ſtalks begin to wither, that is, about the latter end of October, the roots are to be taken up; and the cheapeſt and ſhorteſt way of doing it, is to looſen the earth with a common plough, firſt taking off the earth-board and coulter: when the earth is thus looſened, women and children may ſerve to pick up the roots; and whatever difficulty occurs, the labourers turn up the ſoil with their ſpades.

But a much better, though rather more expenſive method is, to have the earth of the beds turned into the intervals with a three-pronged fork: by this method the roots are taken up almoſt without damage; and many which lie a little deep are ſaved, but which would other wiſe have been left in the ground and loſt; and particularlarly moſt of the vertical or tap-roots are got up.

When the roots are taken up, they are dried as much as poſſible in the air, afterwards carried to a kiln, and laſtly to the mill to be ground.

A light loamy ſoil is better for madder than a rich ſtrong clay; it loves moiſture, but is killed if it is overflowed: therefore, if the ſoil is in other reſpects proper, but too wet, it muſt be firſt drained, or at leaſt the beds muſt be raiſed high, and the intervals ſunk low: on the other hand, if the land is too dry, the intervals may ſafely, and even profitably, be raiſed above the beds: this will at leaſt prevent the young freſh planted ſets from being hurt by too much drought.

When the upper ſtratum of ſoil is deep it is to be obſerved, that the land cannot be ſtirred too deep: the only thing to be apprehended is the expence of doing it: the more the earth is reduced, the more nouriſhment will it afford to the roots of the madder; they require a great deal; but in general madder pays well for any labour that is beſtowed on it.

Dry weather is, if poſſible, to be choſen for taking up madder roots, as the earth then eaſily falls off them, and they need not be waſhed, which is to be avoided; and, in fact, there is no occaſion to waſh them, unleſs they grew in a ſtiff ſoil, and the weather was very wet when they were taken out of the ground.

Some judgment is required reſpecting the time of taking up theſe roots: I have already mentioned that they will, in general, be fit for uſe by the latter end of the ſecond autumn: but this is not always the caſe; and it is much better to let them lie in the ground another year than to ſpoil a crop.

The Dutch often take them up too ſmall, and the French almoſt as often let them grow too large. The two extremes are equally to be avoided: the proper time to take them up is, when they are about the ſize of a ſwan's quill; they then yield moſt dye, and are of courſe moſt proper for uſe. The time when they arrive at this proper ſtate, depends not only on the nature of the ſoil in which they have been planted, but alſo on the good huſbandry that has been beſtowed on the land; for without proper tillage they will turn out but an indifferent crop; but if they are planted on a good loam, are well tilled during their growth, and have favourable ſeaſons, they need never be left in the ground longer than the end of the ſecond autumn, whether they are planted in the ſpring or the autumn.

I have mentioned in this letter many things which will appear trifling to you, when experience has made you more knowing in this culture; for, depend upon it, a greater portion of knowledge is acquired by a little experience than by a great many precepts; the firſt makes a deep impreſſion on the mind, whilſt the latter are ſoon chaſed away by new, and perhaps more pleaſing ideas.

I would recommend it to you, when you begin to plant madder, to depend more on the judgment you ſhall form of things, than on any thing you can read on the ſubject. If you miſcarry in ſome inſtances, you will certainly rectify matters in your future practice: a ſenſible man cannot be long in the wrong.

I have not, I know, given you any ſyſtematical inſtructions in the affair of cultivating madder; and this I purpoſely avoided doing; for, had I attempted telling you in what manner this uſeful plant ought to be cultivated in England, I ſhould certainly have miſcarried, and all I could have ſaid would have amounted only to probable conjecture: had I, on the contrary, given you a circumſtantial detail of our methods of practice here in France, it would only have ſerved to miſlead you, ſo much do the climates of the two countries differ. I am therefore in hopes, that my manner of treating the ſubject will be not only more agreeable, but more uſeful to you, as I have, for the moſt part, only mentioned ſuch circumſtances as may be equally uſeful in the culture of this plant in both countries.

Lay it down as a maxim, that the culture of madder, if properly managed, is very profitable; there are few crops pay better; but then the two extremes to are be carefully avoided; we muſt not let our expences be ſo large as that no crop will repay them; neither muſt we be ſo ſparing as to baulk the growth of the plant for want of proper tillage. A great deal is required, yet too much may be beſtowed on it, for the reaſon above-mentioned: the golden mean is beſt in this, as well as in all other matters: and what this mean is, can only be learnt from experience; for it is abſolutely impoſſible to lay down maxims that will ſuit all countries, all climates, and all ſoils.

What has hitherto been ſaid relates to the common way of cultivating madder; we therefore ſhall now give in his own words, the great improvements made in this article by the ingenious M. Dambourney.

"M. Rondeaux, ſays he, found, eight or ten years ago, on the rocks of Oiſſel, two plants of madder, which he took up and ſet in his botanic garden. He afterwards gave me ſome ſlips of them, and I planted them in a ſimilar place, out of curioſity: but M. Du Hamel's treatiſe ſoon made me perceive the importance of cultivating this plant. I accordingly applied myſelf to it: and by following all the methods which had been pointed out to me, and thoſe which ſeemed to coincide with them, I ſucceeded ſo far as, in four years, to have plants enough to try this culture in the open field. In the mean time I learnt that M. Peter Dupont cultivated with ſucceſs, at Elboeuf, plants of madder which he had received from Liſle in Flanders. He was ſo kind as to make me a preſent of an hundred ſets of them; and this little reinforcement, added to what I had raiſed of my own, obliged me to ſeek for room in my garden at Oiſſel, wherein to extend this culture. Finding no other ſpot vacant there, but two walks, I ſacrificed the pleaſure of enjoying them, to my then new and prevailing inclination. I therefore dug up one of them, the ſoil of which is a yellow and ſandy clay, underneath which, at a ſpade's depth, is a bed of large gravel, cloſe knit with very ſtrong earth: but I did not ſuffer this to be broken into. I divided the walk lengthwiſe, and, without dunging it at all, planted in December 1757, in one half of it, firſt the ſets which I had received from Elboeuf, and then immediately after, but without mixing them, thoſe which I was able to take from my own plantation. The other half of the walk was ſowed in the month of April 1758, with ſeed which I had gathered from my own plants. The other walk was diſpoſed of in the ſame manner, as faſt as I could get plants or ſeed to ſtock it; taking care the firſt year to keep my beds well weeded, and to lay down the branches as faſt as they ſhot out.

"So early as in the autumn of 1758, I gathered ſeeds from my plants of Oiſſel madder, whether raiſed from ſeeds or from ſlips; but that of Elboeuf had not then bloſſomed, though it had put forth ſtalks three feet high; and even in 1759, it produced bloſſoms on only a few ſtalks, whilſt the Oiſſel madder was loaded with them. When the ſtems were withered, I had the curioſity to take up ſome of the roots, and was thereby informed of the following intereſting facts.

"1. Though it is ſaid poſitively, in the Dictionnaire Encyclopedique, that madder raiſed from ſeed requires five years to grow to the ſame ſize as that which is raiſed from ſlips attains to in eighteen months, yet I found all things equal in this reſpect; and if there was any ſort of advantage on either ſide, it was in favour of that which had been ſown: both the one and the other occupied the whole depth of the ground ſo far as it had been looſened, and their roots had, in ſeveral places, penetrated through the hard bed of gravel underneath: but in order to pierce through it, three or four roots had twiſted themſelves together, and ſhaped themſelves exactly to the form of the paſſage they found between the pebbles, in conſequence of which they were more or leſs choaked there; though they afterwards reſumed their natural ſhape and plumpneſs in a bed of ſmall pure ſand which lies underneath the hard bed, and in which I have been obliged to leave ſome of them at the depth of four feet.

"It is plain therefore, from this inſtance, that no time is loſt by raiſing madder from the ſeed, and that this plant may be raiſed ſucceſsfully in the moſt indifferent ſoils, even without the help of dung.

"2. I took advantage of ſome fine days to dry in the ſun, but ſeparately, the roots which I had taken up. Every thing ſeemed to give the preference to thoſe of the Elboeuf ſpecies. They were larger and redder than the others, and their powder was finer to look at: but the effect proved very different. To make a fair compariſon of them, I dyed, with equal quantities of each of theſe ſorts of madder, two equal parcels of cotton prepared in exactly the ſame manner: that which was dyed with the madder originally of Oiſſel took a much brighter colour, and reſiſted during thirty minutes a boiling which the other could not bear during ten. I likewiſe compared its effect with that of the lizary or hazala of Smyrna, and the advantage, as well in point of brightneſs as of the durableneſs of the colour, was alſo on the ſide of the Oiſſel madder.

"This valuable kind appeared to me from that moment to deſerve the preference. In the ſpring of 1760 I ſowed all the ſeed I had of it, part upon hot-beds, and part on beds in my kitchen-garden; and I deſired M. Rondeaux to help me to find out more plants of it upon the rocks of Oiſſel or of Orival: but he aſſured me that he had ſearched for ſuch ſeveral times, in vain: nor was he more ſucceſsful in a journey which he took thither laſt Auguſt, with M. Dangerville.

"I therefore determined to have recourſe to the ſuckers which grow around theſe plants: but though I took them up as carefully as poſſible, I could ſcarcely get any that were rooted; and notwithſtanding that moſt of thoſe which I did plant were yellow for the length of from four to eight inches, yet nine of them in ten died. The offſets of the Elboeuf madder, on the contrary, though taken up with but little precaution, have a great many fibres and young roots, and their taking freſh root is ſure, provided they are planted in cool weather. Nature ſeems then to compenſate the cultivator for the ſcantineſs of the ſeed which this laſt ſpecies produces, whilſt the other yields it in abundance.

"Not to neglect any means of multiplying the Oiſſel madder, I dug up a ſmall ſpot of it, about the fifteenth of laſt June, and took from thence all the ſlender roots which run in great plenty juſt below the ſurface of the ground: I cut them into pieces at every ſecond joint, and planted them the ſame day in channels, where all theſe that were brown and woody became good plants,

plants, and thoſe which were then only yellow and tender rotted.

" The doing of this taught me what I had not learnt from M. Hellot's memoir, nor had any of my correſpondents in Holland informed me of it; namely, from what part of the root it is that the moſt valuable colour is obtained. After all my runners were thus taken off, and replanted, there ſtill remained the ſtock furniſhed with lateral and with deſcending roots, reſembling in form and colour large earth-worms. In three days of ſun-ſhine they were dry, and the parenchymæa, or pulpy part of the root, being then leſſened in bulk, the outer ſkin became wrinkled, becauſe it was then too large. To clear them of this wrinkled ſkin, I had recourſe to a method firſt thought of by M. Paynel of Darnetal, which was, to put theſe roots in a large ſack of coarſe canvas, and to ſhake them ſtrongly therein. The friction of the ſack, and of the roots one againſt another, took off almoſt all that outer ſkin, which I afterwards ſeparated by winnowing, and what then remained was that which alone ought to be called fine and true peeled bunch madder, the effect of which is as ſuperior to that of the azala, as the azala is ſuperior to the fineſt Dutch madder. I would not however adviſe the cultivators of madder to follow this method, any farther than there may be curious and nice buyers ready to give them a price proportioned to the expences it occaſions.

" By thus taking up each ſpecies of madder in the ſpring, one has, as M. Du Hamel gives room to hope, not only the advantage of obtaining ſuckers and joints of roots for raiſing new plants, but alſo, if the ſeaſon be not quite unfavourable, one may dry the root itſelf in the ſun ſufficiently to make it keep, and by this means the expence of drying it with fire in a ſtove is ſaved, and the injury which the fire does to the quality of the madder is avoided. The colouring part would be ſtill more valuable, if the root were dried in the ſhade under a ſhed open on all ſides; and to accelerate this drying, I have ſucceſsfully made uſe of a bed of half baked bricks, upon which I have ſpread the freſh roots. A bed of dry aſhes, ſix inches thick, may alſo be uſed: but in this caſe it muſt be covered with cloths upon which the roots muſt be laid, that the aſhes may not mix with them when they are turned. A floor of plaiſter likewiſe facilitates this drying; and I believe it far preferable to bricks, on account of the ferruginous parts which theſe generally contain.

" The principal difference which diſtinguiſhes the Oiſſel ſpecies is therefore obſervable in its roots, which are ſlenderer, of a leſs bright colour, leſs furniſhed with fibres at their joints, and thoſe joints farther aſunder, than in the Elboeuf madder: but, beſides this, an attentive eye will diſcern many more diſtinguiſhing marks.

" In the ſpring of the ſecond year it riſes ten or twelve days earlier than the other ſorts, its ſtalks are ſlender, and they trail upon the ground as ſoon as they are a foot long; its leaves are of a pale green, long, narrow, thin, waved along their edges (pretty much like that of the laurel); its bloſſoms are diſpoſed in looſe ſpikes, and each of the ſeeds which ſucceed thoſe bloſſoms ſtands upon a pretty long foot-ſtalk.

" The Elboeuf madder, which comes originally from Flanders, and is the ſame as the Flemiſh refugees carried into Holland, puts forth, on the contrary, ſtrong ſtalks, which have frequent joints, and are able to ſupport themſelves even when they are two or three feet long. Its leaves, which are of a deep green, are thick, broad at their baſe, and terminate in a point almoſt like the leaf of they great myrtle, and they are not at all, or very little, w' ved. It does not bloſſom till the ſecond or third year: its flowers are very apt to fall off, and when this accident does not happen, its ſeeds ſtand on ſhort foot-ſtalks. This ſeed grows very well: but the eaſe with which well rooted ſhoots are obtained from this ſpecies renders it the leſs valuable.

" In order to enlarge my plantation, and likewiſe in hopes of enriching it with a new ſpecies, I wrote to Smyrna for ſome ſeed of the azala or izary, and luckily received three pounds of it on the 20th of Auguſt 1760. It ſeemed to be abſolutely like that of the Oiſſel madder, and I ventured to ſow a ſmall part of it, on the 27th of Auguſt, upon an old hot-bed which had loſt all its heat. It roſe well, and the young plants were not injured by the winter. I tranſplanted them into open ground at the end of laſt February, they are now in blo m, and their appearance is exactly like that of the Oiſſel madder, excepting that their ſtems are ſlenderer.

" As to the culture, I ſet out with ſcrupulouſly obſerving M. Du Hamel's directions: but afterwards I ventured to deviate from them in ſome points, in order to adapt it to the leſs attentive genius of our farmers. In the firſt place, I have experienced the truth of what M. Paynel of Darnetal obſerved to me, viz. that the plants which are raiſed from layers, at a great expence, produce only long woody roots, which yield hardly any colour, remain hollow during two years, and produce very few of thoſe vermicular roots, which are the only valuable ones. I have therefore quadrupled the number of plants in given ſpace; the ground has been well filled with them, and the expence of making layers has been ſaved; and, thoroughly to accommodate the culture of this plant to the practice which our country people are accuſtomed to, I have either planted the ſlips, or ſowed the ſeed, in rows after the plough, as is done for kidney-beans, and the workman uſed to earth up theſe performs mechanically the ſame operations for the madder, the expence of cultivating which in this manner is no more than that of raiſing thoſe beans in the field.

" Having obſerved that the eaſt winds in the ſpring, and the heat of ſummer, are equally fatal to whatever is then ſet in the lands about Oiſſel, and that, on the contrary, whatever will bear planting in the autumn ſucceeds very well in them, I took up in October laſt all the plants of two years old madder that were in my garden walks, and theſe afforded me as many ſlips as were ſufficient to plant half an acre of ground. Very few of them failed, becauſe they were all brown and woody. But as the roots which are taken up in autumn, and which one might wiſh to be able to keep, cannot be dried without fire, it is adviſable to dig up in that ſeaſon only the quantity neceſſary to furniſh ſets for replanting, and from June to September to take up what is intended for ſale.

" On the 16th of laſt February I ſowed in a hot-bed the greateſt part of the izary ſeeds which I had received from Smyrna, and the reſt of them a fortnight after in one of the beds of my kitchen-garden. I raiſed from them plants enough to ſtock four hundred and forty ſquare feet of ground, in an open field, where they ſucceed perfectly well: but this tranſplanting checks their growth; ſo that if the ſeed is ſown in the field in May, the

the crop will be in nearly equal forwardneſs: but I have not had cauſe to approve of ſowing it earlier in open ground.

" As it is right to make even inconveniences become leſſons of inſtruction, the impoſſibility of drying without fire the roots which I took up in October, put me upon trying to uſe them freſh, in the ſtate they were when dug out of the ground. I therefore waſhed them well, that no earth might remain upon them: but having myſelf experienced that, as M. Du Hamel obſerves, this root loſes ſeven eights of its weight when it is dried ſufficiently to be reduced into powder, I judged that I muſt proportion my quantity accordingly. I therefore put into a quantity of liquor which would have required a pound of powdered madder, eight pounds of freſh roots bruiſed in a mortar, and with this I dyed ſome cotton, in the uſual way. When the dying was finiſhed, I found that the liquor was ſtill over-charged, though the cotton had imbibed ſo deep a dye as to require two boilings to bring it down to the uſual colour: upon which I repeated the experiment with ſix pounds, and afterwards with four pounds, and I found that this laſt proportion of undried roots is that which gives a colour equal to what is extracted from a pound of dried and powdered madder. One half of the quantity of roots commonly uſed may therefore be ſaved by dying with them when they are freſh dug: but, though this is a great ſaving, it is not the only one.

" 1. There is no need to build kilns or ſheds for drying the roots in changeable weather.

" 2. One is exempted from the inconveniences of a too haſty or too ſlow drying, either of which is equally hurtful to the quality of the madder.

" 3. The waſte occaſioned by the peeling, garbling, winnowing, &c. of the roots, in the doing of which many, if not all of the ſmall ones, that are not for example thicker than ſtraws, are ſeparated with the refuſe parts, and thereby generally loſt, is hereby ſaved.

" 4. The expence of grinding is ſaved, together with the waſte and fraud which may be committed at the mill; and likewiſe the inconvenience of waiting till the mill is at liberty, which is of no ſmall conſequence in places where there are not mills appropriated to the grinding of madder only.

" 5. Laſtly, the roots thus uſed do not evaporate or ferment, as the powdered madder always does if it be not ſpeedily uſed.

" All theſe advantages put together may be deemed equivalent to a ſaving of five eights in the quantity. The planter who knows how to dye may reap the benefit of them the moment that his roots are large enough to be taken up: the dyers by trade will by degrees be ſenſible of the advantage, and ſhare the profit of the planter, when the madder grounds are nearer them: they will even find themſelves under a neceſſity of ſo doing whenever this method ſhall become general, and this will be a means of rendering it ſuch; for as there is no particular time to be waited for in order to the madder's acquiring maturity, after it has been planted eighteen months: the huſbandman who carries a parcel of freſh roots to market will be ſure of ſelling them in that ſtate, and the dyer may buy them daily, in proportion to the quantity he wants; or he may agree with the planter for ſuch and ſuch quanties to be delivered to him at ſuch and ſuch times. I have moreover experienced that theſe roots may be kept freſh during ſeveral months, by laying them in a hole three feet deep, in alternate layers of roots, and of earth.

" This experiment pleaſes me again in its tending to leſſen the expence of dying, and conſequently to reduce the price of our dyed ſtuffs at foreign markets, by which means our trade with other nations may be benefited: and it is likewiſe new, ſince neither M. Hellot nor M. Duhamel have pointed it out. I have alſo experienced that the Elbœuf madder is very good when it is uſed freſh; a circumſtance by ſo much the more important to be known, as this ſpecies is not only the longeſt lived of any, but alſo the moſt eaſily propagated.

" The principal difficulty now remaining for me to ſurmount, is to find out ſome cheap and eaſy way of taking up the madder, without leaving in the ground its deſcending roots, which yield the beſt colour; for the method which I have hitherto practiſed has been conſiderably expenſive. M. Duhamel propoſes a plough which turns over the earth, without a coulter: but if I may judge from what I have ſeen, this expeditious inſtrument can ſuit none but lands where a clayey bottom hinders the vermicular roots from piercing deep. I wrote to Holland, to know how the Dutch manage in this reſpect: but thoſe zealous patriots are very reſerved in every thing relative to this plant, of which we let them be the monopolizers: I was anſwered, that they uſe the ſpade and the fork. However, I ſhall try what my zeal and what incidents may ſuggeſt to me, and ſhall communicate whatever I may find to anſwer beſt.

" An objection which may, perhaps, be ſtarted againſt this branch of huſbandry in France, is that there may be danger of its prejudicing that of our corn, which is an article of the greateſt neceſſity. But beſides that we have immenſe tracts of uncultivated lands where it might be eſtabliſhed, I can, with M. Duhamel, aſſert, that the profit of the madder may be had in the beſt fields of this province (Normandy) without diminiſhing the crops of the moſt valuable corn. In effect, it remains in the ground but eighteen months, and after it is taken up, a ſingle ploughing is ſufficient to enable the land to produce very fine wheat, without any manure. Now it is the cuſtom in all our wheat grounds to take a crop but once in three years, and this may be had after the madder. Nay, an advantage may be reaped even in the firſt year, by ſowing, between the rows of madder, onions and other pot-herbs, which do not root deep or occaſion much ſhade: but there will be a ſtill greater profit in making it grow jointly with kidney-beans, becauſe, the rows being regular, nothing would hinder the after-ſtirrings, which contribute ſo much to promote vegetation."

M. Dambourney continued his experiments on madder, and gives the following account of them.

" I have reſtricted myſelf to the three ſpecies which yield the brighteſt and moſt laſting colour: theſe are, the madder originally of Oiſſel, that which is ſometimes found growing wild in the vineyards of Poitou, and the lizary or hazala of Smyrna. All theſe bear ſeed in their very firſt year, and in the ſecond one may gather two thouſand ſeeds from a plant which would not afford at moſt above twenty or thirty ſlips. The difference between theſe means of propagation is ſtriking, and ought to be decilive in all countries where the ſeed ripens well, as it does in almoſt every part of France.

" The manner of raiſing it from the ſeed, as practiſed by me, is thus. Along a wall which fences off the north wind,

wind, let a trench be dug two feet deep, five feet wide, and of ſuch length as may be moſt convenient; then, towards the middle of February, let it be filled with hot dung of horſes or mules, well preſſed down, to within about three inches of the level of the ground, and afterwards fill it quite up to the top with fine mellow mould, preſſed down gently, and laid ſmooth with a rake. A bed of this ſort is preferable to any other, becauſe a common labourer can make it very well, whereas it would often be neceſſary to have recourſe to a gardener to make a raiſed hot-bed. The expence is not to be regarded, becauſe this bed may be ſown ſix times in a year, and the mould which may be taken from it afterwards will be worth as much as the coſt of the dung. The uſing of this bed does not at all prevent ſowing likewiſe in the beds of a kitchen garden: but as this laſt ſhould not be attempted before the middle of March, for fear of froſts, there will be a great advantage in ſowing upon the hot-bed; for a month gained in this ſeaſon is invaluable.

"On the 20th of February, 1762, I ſowed upon ſuch a bed ſome madder ſeed in ſmall channels about an inch deep, and three inches aſunder. This method is always preferable to ſowing in broad caſt, becauſe the ſeed is better covered, and the weeding is more eaſily performed. The young plants appeared after nineteen or twenty days, they were watered and weeded when neceſſary, and on the 30th of April they were fit to be tranſplanted into open ground.

"As moſt of our farmers are, unhappily, not able to advance money for a culture from which they have no proſpect of reaping a return in leſs than eighteen months, I tried, laſt year, what would be the event of ſowing madder at the ſame time as kidney-beans, and in the ſame furrows of the plough. The beans, which riſe in leſs than eight days, required to be earthed up when the madder had ſcarcely appeared above ground; and this operation ſmothered the madder entirely. I therefore judged it moſt proper, this year, to ſubſtitute my young hot-bed plants of madder in lieu of the ſeed; and accordingly, when the weather was moiſt, for that is an abſolutely neceſſary circumſtance, I ſet ſome of my people to plant a piece of ground which had been well prepared for a crop of dwarf-beans. In each furrow of the plough where theſe beans were ſown, women and children placed the young plants of madder ſix or ſeven inches aſunder, fixing the root in the bottom of the furrow by means of a handful of earth put around it, and reſting the green ſtem againſt the ſide of the furrow, the ſurface of which it exceeded by at leaſt one row of leaves. The ploughman ſtopped a little at the end of the furrow, till the whole of it was planted: he then opened with his plough, which had a ſhifting mould-board a ſecond furrow, in which nothing was either ſowed or planted; and at the ſame time the earth turned out of this filled the firſt. A woman finiſhed this filling with a rake, as well to cover the beans completely as to earth up the plants of madder. The third furrow was ſowed and planted like the firſt, and this was continued till the whole extent of the ground was planted in rows fifteen inches aſunder. This work, which did not in the leaſt alter the common method of cultivating the beans (excepting that only two thirds of the uſual quantity of ſeed were uſed) was performed in five hours, by one ploughman, three women, and three children. The ground thus planted contained upwards of twelve thouſand ſets of madder; and theſe had taken freſh root, and had begun to ſhoot up when the beans roſe. It was weeded twice, its ſurface was ſtirred, and the plants were earthed up as uſual, without any danger. Both throve well together: the beans were pulled up when they were ripe, and the madder, now ſole poſſeſſor of the ground, covers it like an artificial graſs. The greateſt part of it has yielded a little ſeed. The crop of beans, notwithſtanding the drought of this ſummer, is almoſt equivalent to the expences, and next year I ſhall have that of the ſeed and roots of the madder, at the expence of only a ſtirring of the ſurface and a ſingle hoeing in the ſpring.

"My hot-bed was no ſooner cleared, than I ſowed it again with madder: but the extraordinary drought of the ſeaſon obliged me to leave it there till the 6th of Auguſt, by which means I loſt a crop. I then took advantage of a rainy day to tranſplant it: and this was done in the ſame way as before, excepting, that the ſeaſon was too far advanced to admit of ſowing beans at the ſame time. The length of the roots of the madder likewiſe required more precautions to fix them with the earth at the bottom of the furrow, in which one of the horſes being forced to tread in order to open the next furrow, the whole would have been trampled to pieces, or dragged out of the ground. Yet the ſame number of work people as before-mentioned, ſet ſixteen thouſand plants in ſix hours. The ſpot is well filled, and the plants will be ſtrong enough to reſiſt the winter.

"On the 15th of May, being deceived by a ſmall rain, I ſowed near an acre of ground in alternate rows, as it practiſed for beans, but only with madder. I uſed for this purpoſe three quarts of ſeed, which I have much regretted; for the conſtant drought has hardened the ſurface of the earth ſo that the young plants have not been able to pierce through it, and conſequently all has been loſt. The method which I am now going to relate will prevent this inconvenience hereafter.

"I ſowed my hot-bed, for the third time, on the 6th of Auguſt, with a deſign to let the young plants remain there all the winter and not to tranſplant them till the end of February: but the nineteen or twenty days which this ſeed requires, in order to its ſprouting, diſconcerted me. It was neceſſary, in that hot ſeaſon, to water frequently by hand, and this, beſides wearing out the gardener, laid bare ſome of the ſeeds, which grew no more. It then occurred to me, that this might probably be remedied by ſowing ſeed which had already began to ſprout. Accordingly, I filled the bottom of the box with moiſt mould a quarter of an inch thick, then covered this entirely with ſeeds, and ſo proceeded in alternate layers, the laſt of which was of mould. I kept this box well watered, though expoſed to the ſun, and each day I examined the progreſs of the ſeed. It was on the eighth that the germ began to appear, and the very next day it was three quarters of an inch long. I ſeized that inſtant to lay in channels made in the hot-bed both the ſeed and the mould in which it had ſprouted: I then ſmoothed the ſurface of the bed, and two days after all the rows appeared diſtinctly. This method likewiſe ſaved me a weeding, which I had generally found to be neceſſary as ſoon as the ſeed which had not been made to ſprout before-hand had riſen. The growth of the young plants was ſo rapid, that inſtead of letting them remain there all the winter, as I firſt intended,

tended, I ventured to tranſplant them into open ground on on the 14th of laſt September. Froſt is a little to be feared for this laſt plantation: the event will be a leſſon for the future.

"Eight days before theſe plants were taken up, I laid another parcel of ſeed to ſprout, in the ſame manner as before, and therewith immediately replanted my hot-bed. It has riſen well, and will paſs the winter there. I hope (by thus uſing ſprouted ſeed) to be able next year to raiſe at leaſt ſix crops on the hot-bed. I likewiſe ſowed at the ſame time ſome of this ſprouted ſeed in a bed of my kitchen-garden, where it roſe in four days. I intend alſo to venture ſome of it about the end of next April in a ſpot with beans; and I preſume that as this already ſprouted ſeed will riſe ſooner than them, the plants of madder will be able to bear the firſt weeding and ſtirring neceſſary for the beans; in which caſe the expence of culture will be much leſs than the charge of removing the young plants, and both the hazard and the delay of their taking freſh root will be avoided. If this trial ſucceeds, it will be the greateſt inducement that can be for the farmer to adopt the ſame method, ſince it will require only one ploughman, a woman to ſow the beans after the plough, another to lay the ſprouted madder in the furrow, and a perſon to cover the whole over with a rake.

"The gathering of the ſeed is expenſive when one has but little of it, becauſe, for fear of loſing any of it, it is gathered almoſt ſeed by ſeed. I thought myſelf rich enough this year to try another way of doing this work. I cauſed all the tops to be cut off with a reaping hook, when there remained upon them but a few ſeeds that were not ripe, and the whole was then laid upon cloths in the ſun. In two or three days the ſtalks and leaves became ſo brittle, that a few ſtrokes of a ſwitch reduced them into duſt. Two turns of a winnow blew away their duſt, and with it the unripe ſeeds, which, after they had been dried, were found to be lighter than the black or purple ones, in which the horny ſubſtance was formed. I hope next year to be in a condition to proceed with ſtill leſs precaution, that is to ſay, to mow at once all the branches and ſtems, and then to ſeparate the ſeeds from them in the ſame manner as before. It generally is during the whole of the month of September that the ſeed of madder is fit to be gathered.

"After the ſeed has been thus ſeparated from the ſtalks and winnowed clean, it muſt be expoſed to the ſun till it becomes perfectly dry; for if there remains the leaſt mucouſneſs in the black pulp which ſurrounds it, a fermentation will enſue in the winter, or at leaſt a mouldineſs, which will deſtroy the germ. It muſt afterwards be put up in bags of thin cloth, and theſe ſhould be hung to the ceiling of a dry and airy place, as well to preſerve the ſeeds from all moiſture, as from mice, which are very fond of them.

"If it be intended to ſow wheat after the crop of madder, the roots of this laſt muſt be taken up in the beginning of October. It is not poſſible for me yet to point out a better method of doing this, than to begin at one end of the field, and trench the whole ground two or three feet deep, whilſt women gather up the roots as the men purſue their digging. The ground is then ſo well prepared for wheat, without uſing any dung, that two-thirds, or at moſt three-fourths of the uſual quantity of ſeed, will be ſufficient to ſow it.

"The madder now taken up might become burthenſome to the planter, if the conſumer thereof ſhould ſeek to take advantage of the eaſe with which it corrupts: for the huſbandman would in ſuch caſe, be forced either to dry on kilns whatever he takes up in this ſeaſon, or to ſell it at whatever price the buyer ſhould be pleaſed to offer. Theſe inconveniences ſeemed to me the greateſt obſtacles to the progreſs of this branch of cultivation, becauſe they neceſſarily required, in the common way of proceeding, either that kilns ſhould be built for drying the madder, or that its roots ſhould not be dug up till they were to be ſold. I therefore tried, as follows, to remove theſe diſadvantages. On the ſixth of October 1761, I dug in my garden, a hole three feet deep, into which I threw thirty plants of madder, then filled up the hole, and let it remain thus expoſed to the air and rain. I cauſed it to be opened on the 30th of laſt March, and found all the roots in good condition. It was filled up again till the 15th of September, when, upon its being opened anew, even the vermicular roots, the broken ones, and thoſe which had been ſeparated from the plant, ſeemed to me as firm and as ſound as when they were firſt put into it; but to be certain whether they had not ſuffered ſome alteration imperceptible to the eye, I have dyed with them in compariſon with roots which I took up on purpoſe, and I have not found any difference in the liquor, or in the brightneſs and fixation of the colour.

"The huſbandman may therefore, in caſe of need, keep his crop of madder a year in a hole made in his farm-yard, or in a pit dug at the end of the field; only obſerving to lay it in alternate layers of roots and of earth. He will thus be enabled to wait till he finds a proper opportunity to ſell, and the buyer will no longer have it in his power to tyrannize over him by taking advantage of his neceſſities. The dyer, who will know his own intereſt well enough to adopt my method of dying with freſh roots, may alſo keep them equally well in the ſame manner, in a hole in his cellar, from whence he will take, whenever he pleaſes, whatever quantity of them he has occaſion to uſe.

"It may not be amiſs to repeat here, that when theſe roots are uſed freſh they need only be waſhed a little to clear them of earth, and that the quantity of them put into the dye ſhould be after the rate of four pounds for each pound of ground madder which the operation would require. Theſe roots are cut into middle-ſized pieces, and pounded in mortars of ſtone or wood (iron abſolutely excepted) till they are reduced into a kind of pummice, and this is thrown into the copper when the water (of which I have experienced that, in large works it is hurtful afterwards to increaſe the quantity) is a little more than lukewarm. The liquor is then heated to a degree at which a man can hardly bear to hold his hand in it, and whilſt it is in this ſtate the ſtuff or cotton is puſhed down into it, and there worked about during three quarters of an hour, between hot and boiling, after which the liquor is made to boil during three quarters of an hour more.

"As this liquor remains, after the dying is finiſhed, much finer than that which has been made with the Dutch ground madder, I intend this winter to try whether it may not be put to ſome farther uſes; and I ſhall, in due time, give an account of whatever I may ſucceed in."

M. Duhamel thinks the month of September the moſt proper time for cutting the ſtems of madder, in order to their being made into hay. The Flemings cut theirs in Auguſt: but that is when they do not intend to ſave the ſeed, of which indeed their madder yields but little, as

was

was before obſerved. As Mr. Ray informs us that the madder which grows wild in England preſerves its verdure all the winter, it will become a conſiderable addition to our winter and ſpring ſucculent food for cattle, and this will add greatly to its value; for this plant has been experienced to be an excellent fodder for cattle.

Cows fed with the tops of madder yield plenty of milk, which is a little tinged with red; and the butter of it is yellow and well taſted.

After the madder has been cut for hay, the ground ſhould be gently ſtirred, eſpecially in the alleys, and particularly if theſe are to be planted with madder the next year.

When the ſame ground is to be planted anew with madder, the whole of it ſhould be thoroughly ploughed after all the roots are taken up, and the beds ſhould now be made where the alleys were before. If the ground is ſown with wheat after this ſecond crop of madder has been taken up, the farmer may reaſonably expect an abundant crop of corn: for beſides that madder does not impoveriſh the ground, the weedings and frequent ſtirrings neceſſary for the culture of this plant prepare it well for wheat or any other crop. M. Duhamel confirms this by the following experiments.

A field of madder being dug up, he ſowed it with ſpelt, which was harrowed in, and did not appear for ſix weeks, becauſe the ground was very dry: and even after this, only a ſmall quantity of it ſprouted: yet, at harveſt, this field yielded as many ſheaves as others in the ſame country; but with this eſſential difference, that the ſtraw of theſe was ſix feet long inſtead of four, and the ears were as long again as thoſe in the other fields.

Another year, having ſown ſpring-wheat after a crop of madder, there were, at harveſt, twenty dozen of ſheaves on an arpent (about an acre and one fifth) whilſt the other fields yielded but eight or nine. Likewiſe, another year again, having ſown oats on a piece of ground where the madder had juſt been dug up, it yielded forty dozen of ſheaves to the arpent. The common lands produced that year but five or ſix dozen.

The peaſants about Liſle, being in too great a hurry to enjoy the fruits of their labour, take up their madder before its roots have attained a proper ſize. The Zealanders let their's grow larger. A medium ſhould however be obſerved; for the roots which have remained long in the groung yield leſs dye than thoſe which have ſtood only till they have acquired the bigneſs peculiar to each kind.

This root, which is one of the beſt ingredients that can be uſed for dying wools and ſtuffs, gives them a red colour, not very bright, it is true; but which reſiſts, without alteration, the influence of the air, the heat of the ſun, and the effects of the ingredients made uſe of to try colours: it contributes alſo to make other mixed colours laſting: finally, a method is found out of giving cotton a very pleaſing and laſting carnation colour with it. All parts of the root do not yield this red; the dye of ſome parts fades, and other parts are worth nothing at all.

In examining a well-conditioned root of madder with a microſcope, under the outer bark, in the fleſh may be perceived ſome red particles, which certainly yield the colour which the root contains; but there is, beſides this, ſeen a great quantity of woody ſubſtance of a fallow colour; and this ſubſtance probably impairs the firſt mentioned colour. According to M. de Tourniere, this fallow colour is not ſo good a ſhade as the red; and he imagines that leys, &c. give a brightneſs to the colours dyed with madder in no other reſpect than by abſtracting this fallow colour. The ſun and dews have the ſame effect on yarn dyed with madder, when it is expoſed on the graſs.

M. de Tourniere alſo imagines, that the part which yields the red, is, in the green root, diſſolved in a mucilaginous juice; for the bark, and the other parts which contain moſt red, are alſo moſt ſucculent: by drying them in a kiln they loſe ſeven eights of their weight, and yet the roots are not perfectly dry; for they bend before they break; they are rather bruiſed than ground by the mill; and this unctuous powder is apt to clot: it is true, that in time they loſe this unctuouſneſs, and become dry; but at the ſame time the quality of the red particles is lowered. Theſe obſervations are well deſerving of attention; for they make it evident to us, that theſe valuable particles may be impaired by too great a heat: ſuppoſing it unctuous, were it too much dried, perhaps water would not diſſolve and ſeparate its parts. Finally, theſe reflections of M. de Tourniere agree very well with the experiments of M. d'Ambourney, and convince us that madder-roots may be uſed green with very conſiderable advantage. But green madder can never be uſed, except when the grounds lie convenient for the dyers: thus, when madder is to be carried to any conſiderable diſtance, it muſt of courſe be dried, and pulverized. I ſhall reſume this ſubject.

1. As madder-roots are very apt to ferment when they are bought green, it will be neceſſary to examine carefully whether they are ſpotted, or have a muſty ſmell: if the fermentation has given them a black hue, they are by all means to be rejected.

2. The roots to yield a fine dye ſhould be freſh: ſuch as are duſty on being broke muſt therefore be rejected, and with ſtill greater reaſon thoſe that are rotten and worm-eaten: on the contrary, ſuch ought to be preferred as have a ſtrong ſmell ſomewhat like that of liquorice: the ground-madder ſhould be unctuous, and run into clots on being handled.

3. As madder is ſold by weight, it is an advantage to the purchaſer to have the roots quite dry; but he ſhould be careful that they have not been kiln burnt: ſuch as have a ſtrong ſmell have ſeldom this defect. Too haſty a drying wrinkles and ſplits the bark: and, as it then ſeparates very eaſily from the wood, the moſt uſeful part is loſt: the bark therefore ſhould be ſmooth, entire, and adhering to the wood: but we muſt not confound the true bark with the outer bark, or epidermis, which would only leſſen the brightneſs of the colour.

4. The largeſt roots are not always the beſt: they are frequently yellow, and have but little of that red which alone yields the colour. The very ſmall roots are of little value, as they have too much outer bark, which hurts the colour: but thoſe of the beſt quality are from the ſize of a gooſe-quill to that of the end of the little finger.

5. In breaking the roots there may be ſeen, as I have already obſerved, two ſubſtances differing one from the other: that which inclines to a yellow only, hurts the dye: that of the deep red is the part really uſeful; conſequently the higheſt coloured roots ſhould be preferred.

It would be a uſeful diſcovery could there be a method found out of extracting the red particles without any mixture with the fallow or yellow part: I am of opinion

the trials ſhould be made on the green root, that the red particles, which are then in a ſtate of diſſolution, may be more eaſily extracted.

6. As the ſureſt method of knowing the quality of madder is to make a trial of it on ſome piece of ſtuff, it will not be amiſs if ſuch as plant much of it accuſtom themſelves to make this trial, that they may demonſtrate to the purchaſers the quality of their roots: the following proceſs for doing it, is extracted from the works of M. Hellot.

To dye a pound of woollen-yarn, a bath muſt be made with five ounces of alum, and one ounce of red tartar, diſſolved in a ſufficient quantity of water: the wool that is to be dyed muſt be well drenched in this liquor: in about a week half a pound of groun dmadder root is to be thrown into water as hot as you can bear your hand in it: and, after having mixed the water and powder together with a ſtick, the wool is put into it; and the bath muſt be kept hot for an hour, but not boil; for, if it did, the colour would be dull: but towards the end of the time the bath is made to boil; but the yarn muſt be inſtantly taken out.

As very trifling circumſtances will affect the beauty of the colour, it will not be amiſs to make at the ſame time two trials with the ſame yarn; one with the madder that is to be proved, and the other with the fine madder of Zealand, or azala: the beauty of the ſkains will determine which is the beſt madder.

As theſe trials may as well be made on two or four ounces of yarn as a pound, the baths may be made accordingly. I ſhall now treat of the methods of drying and pulverizing madder.

We have obſerved that green roots are very apt to ferment: it is therefore neceſſary to abſtract the great quantity of moiſture that cauſes it. If the weather is very dry and hot, it is certainly adviſable to take the advantage of it to dry the roots in part, and ſave wood; but, if the weather is damp, the roots muſt be ſpread under ſheds, or on barn-floors, and often moved: for, if they were laid in heaps, they would ſoon heat, and change, more or leſs, according to the ſtate of fermentation they were in. With care the fermentation of the roots may be greatly leſſened; and, according to M. d'Ambourney's opinion, they may even be kept good for ſome time; but the roots cannot by theſe means be made dry enough to preſerve them from any change. For ſmall crops a common oven will ſerve; but it muſt not be heated to above forty-five or fifty degrees of M. de Reaumur's thermometer. But this method is very tedious, and it would require very large ovens to ſupply the place of kilns. To ſave the expence of building a kiln, I would recommend the making a place over the roof of the oven, to put the roots in, that they may begin to dry: but, if we grow much madder, it is abſolutely neceſſary to have a kiln proportioned to the quantity that is to be dried, not only of our own crops, but thoſe of the peaſants that cannot afford kilns.

The kilns may be made of very different forms, many of which are of equal goodneſs; but when a man propoſes building one, he ſhould be attentive, 1. That it may contain a large quantity of roots: 2. That it may be worked with eaſe: 3. That as little fuel as poſſible may be uſed: 4. And that it be ſo contrived as to retain an equal and moderate heat. To make theſe matters eaſy to planters, we ſhall deſcribe the kilns that have been long in uſe at Liſle for drying madder-roots: we ſhall point out their defects, as well as the defects of two kilns that were ſucceſſively built at Corbeil; and, laſtly, we ſhall mention the attempts we have made to improve and perfect them.

Deſcription of the Liſle Kiln.

This kiln differs very little from that uſed for drying malt. To have a general idea of it, we muſt ſuppoſe there is a large furnace, in which a great fire is made: this furnace is made under an arch; the hot air and ſmoke paſs through a funnel over the furnace, and ſpread themſelves in a ſpace in form of an inverted pyramid, the bottom of which is covered with a perforated floor, on which the madder-roots are ſpread. This is the general form of the kiln; but we ſhall give a deſcription of it according to the figures in the plate, for the uſe of ſuch as intend to build one.

Fig. 1. Plate XVIII. repreſents the ſection of a building, containing a madder-kiln.

In this building may be ſeen a vault, K, K, a ground-floor, L, L, and a firſt floor, G, G, over which we are to ſuppoſe a granary, H. The foundation of the brick-work of the kiln, is ſomewhat lower than the bottom of the vault; the walls terminate in arches, at the bottom of the firſt ſtory; the ſide walls of the building ſerve as upright ſupporters; and the arches of the kiln are ſuſtained by jambs, which are put into the ſide-walls. All this will be better underſtood by explaining the letters of reference.

A, an aſh-hole two feet wide, three feet and a half deep, and two feet three inches high. B, the furnace with an iron grating, *b b*, at bottom. C, a pricked line, which determines the height of the furnace door: this aperture is ſixteen inches wide, and ſeventeen high. D, the chimney, B, the perforated funnel, which diſperſes the heat, by means of the holes, *i i i*. It is to be obſerved, that this chimney is entirely covered at the top, to prevent any thing falling into it. I I I, holes two inches ſquare, by which the heat eſcapes; they are placed chequerwiſe. F, an empty ſpace, into which the heat goes, out of the funnel before it reaches the upper ſtory. G G, a floor ſet with ſquare tiles, on which the roots are to be ſpread one foot and a half thick. Theſe tiles are fifteen inches long, ten or eleven wide, and two thick; they are perforated with conic holes, as here repreſented. H H, tubes four inches wide, by which the ſuperfluous ſmoke eſcapes, and through which fall the duſky particles that drop through the holes in the tiles of the floor G. Theſe tubes are ſtopped by a little iron door, which is opened when the heat is too great.

K, the vault in which the fuel is kept. L places where the undried madder is ſafely kept. M, iron joiſts two inches thick, traverſed by bars which bear the tiles that compoſe the floor. N, iron braces fixed to the beam P, to ſupport the floor G. P, the beam of the ſecond ſtory. Q, a caſement or window, to be opened at the beginning of every drying, to let out the ſmoke. When the madder begins to dry, theſe caſements are ſhut, to keep in the heat. There are alſo in the ſecond flooring two trap-doors, which are open to let out the ſmoke and ſteam.

Fig. 2. repreſents the plan of the furnace. The three iron bars which croſs it, are each two inches and a half broad, and ſix lines thick; they are let into the wall three inches;

ches; the bars of the grating are one inch ſquare, and vetted to the other bars. In this plan are to be ſeen the ubes marked H, to ſhew that they run the whole depth the furnace. Theſe tubes are very neceſſary to convey to the kiln the heat from the body of the furnace.

Fig. 3. repreſents the plan of the tiled floor, G: it is xteen feet ſquare.

As the furnace we have deſcribed reſembles that uſed for rying malt, we were willing to obſerve in what manner t was dried, and remarked, that they lay it about nine nches thick, and that it is very hot at bottom. When M. de Reaumur's thermometer was applied, it roſe upvards of twenty-two degrees above Zero; but the upper art, being influenced by the external air, heats but little: he ſteam that riſes, being condenſed by the cool air, is educed to water, which occaſions the upper part of the ed of malt to be always wet: for this reaſon it muſt be often turned. In this method, by being often wetted with he ſteam, the bed of malt is much retarded in its drying. We imagined this inconvenience might be removed, by preventing the external air from affecting the ſurface of the bed: and this would be affected by making a covering for it: and, if this covering could be fixed within a foot of the malt, another advantage, which we ſhall mention, would reſult.

It is well known in phyſics, that the vapours which ariſe from heated matter, have a great power of penetrating and heating the matter whence they proceeded, provided they are collected, and in ſome manner reverberated on the matter to be heated: it is on this principle the machine was conſtructed in which the bones of animals could be diſſolved; and we know, that in an equal degree of heat, water has eight hundred times more volatility than air; and vapours or ſteam contain a great deal of water.

This induced us to think, that it would be of great uſe to reverberate the ſteam on malt and madder-roots, by means of the covering above mentioned. M. Villot, a brewer at Paris, who takes all opportunities of improving his beer, has made ſome experiments of this nature, and in part ſucceeded. It is only neceſſary then to contrive a method of putting this in execution in a large building, of which we ſhall in due time take notice.

One great defect of the Liſle kiln is, that the ſmoke, mixing with the roots, charges them with fuliginous matter, which probably hurts the colour, and is perhaps the cauſe of the difference betwixt the Levant madder and that of Liſle, theſe laſt being by no means fit for dying cotton, as done in the Levant; beſides, in theſe kilns the workman cannot properly regulate his fire: theſe defects might be removed by making the middle cloſe, and terminating it in a tube of caſt or hammered iron, to carry off the ſmoke; the floor, ſupported by iron bars, might very well be diſpenſed with, and inſtead of it one of wood, lattice, wicker-work, or iron wire, would do; for the tunnel once properly ſecured, there will be no danger of fire. In order to enable every one to vary the conſtruction of theſe kilns, we ſhall add ſome reflections and obſervations made with great care by M. de la Levrie, who ſuperintended the building of two kilns at Corbeil.

Remarks on the Kiln uſed at Liſle.

It will not be amiſs to begin by relating the experiments made with two kilns, built one after the other at Corbeil, to dry madder, as thereby the advantages of that, herein after propoſed, will be more evident.

The firſt of theſe kilns was twenty-one feet long, twelve wide, and ten feet high: within-ſide it was ſurrounded by three ſtages of hurdles, like ſhelves, four feet wide, and twenty inches one from the other: the firſt ſtage was five feet from the ground: on theſe ſtages the green madder was laid eight inches thick. In the upper floor was a trap-door, which opened to let out the ſteam of the root. The furnace, which was not without defect, went three feet within the kiln: it was ſupplied with fuel from without: within-ſide it was furniſhed with metal tubes, which paſſed through the fire: theſe tubes received at one end the outward air, which they diſcharged within, very hot, by an aperture two feet from the ground. The effect produced from this kiln was as follows: the three ſtages, being filled with roots, thoſe on the upper ſtage became dry enough to ſend to the mill. It is true, they dried but ſlowly, becauſe the ſteam, which proceeded, though in no great quantity, from the two lower ſtages, wetted the under part of the hurdles of the firſt ſtage, thereby retarding the work. The heat, which was not powerful enough to raiſe all the moiſture of the madder-root on the lower ſtages in ſteam, made them ſweat abundantly, ſo that the under parts of the hurdles were covered with drops of water as big as the finger's end, which fell from the ſecond ſhelf on the firſt, where they wetted the root; and from the firſt ſhelf they fell to the ground. On the upper ſhelf were very few of theſe drops of water, except for a very ſmall ſpace of time after the kiln had freſh roots put into it, becauſe at the upper part of the kiln the heat was powerful, and regularly diſperſed, whilſt at the bottom it was cold. At each ſtage was fixed one of M. de Reaumur's thermomenters: after four days continual fire the loweſt ſcarcely roſe to eighteen degrees; the ſecond, ſomewhat higher; and the uppermoſt never paſſed eighteen degrees, which is thought ſufficient, when the drying is not retarded by any ſteam from below. When the dried root was carried to the mill, the root from the ſecond ſtage, which had loſt part of its moiſture, was removed to the third, and that of the firſt ſtage, ſtill wet, was laid on the ſecond, the firſt ſtage being filled with freſh roots. The loweſt thermometer then fell to fourteen degrees, and the uppermoſt to Zero: this induced them to dry all the roots that were at once put into the kiln, before they admitted any freſh; yet even in this method it was neceſſary to move the roots from the lower to the upper ſtages, where the laſt laying dried faſter than the others. As this work was tedious and troubleſome, it was determined to take down this kiln, and build a new one, now in uſe.

The ſecond kiln is of the ſame length and breadth as the firſt; but the hurdles on which the madder is put are raiſed only ſix feet from the ground, and the apertures of the furnace, which ſupply the hot air, are level with the ground: they, beſides, continued to avail themſelves of the miſtaken advantage of encreaſing the furnace to contain more roots, by making, as in the firſt, three ſtages of ſhelves. The roots indeed dry in it faſter, becauſe the furnace yields more heat; but this heat is very unequally diſperſed at the different heights, and in the different parts of the length of the kiln; becauſe the ſame inconveniences ſtill ſubſiſt, as they have made in it, like the other, three ſtages, one above the other, and they have formed the kiln long, without letting the furnace extend through its whole length,

length. They have beſides placed the firſt ſtage too near the fire; but this may be remedied by taking it entirely away, and uſing only the uppermoſt ſtage, which is fifteen feet from the bottom of the kiln, and may extend over the whole of it: the heat will then be more regularly diſperſed. The roots may be laid fifteen or eighteen inches thick, and may be much eaſier attended to than on the ſhelves, which occaſion a great deal of trouble: there might alſo be two furnaces, one at each end of the kiln, and the tubes might be carried over the whole length of it.

From what has been ſaid, we may conclude, that to dry a plant like this, which contains a great deal of moiſture, no advantage can reſult from having a kiln with three ſtages, one hurting the other; ſince the heat tending always upwards, the roots muſt be moved higher, which cannot be done without trouble, loſs of time, and expence; whereas, the ſame quantity may be dried in leſs time on a floor raiſed eighteen or twenty feet above the furnace.

It is certain that a peaſant, who raiſes madder after a proper method, will always be a greater gainer than ſuch as are obliged to hire day-labourers. But the peaſant cannot go to the expence either of a kiln, or a mill: it muſt be planters who raiſe large quantities of it, and can afford the expence, that have them: thus it is to be preſumed, the peaſants will be under a neceſſity either of ſelling their roots green to the dyers, of taking them up in the ſpring to dry them in the ſun, of drying them in their ovens, when they have only a ſmall quantity; or, finally, of carrying their roots to the kiln, as they do their grapes to the preſs.

The Liſle kiln, though built on a good principle, is too expenſive for a young planter. There muſt be ſtrong walls to ſupport the arches, internal abutments, and bricks to build the arches with. In ſome provinces there is not a workman capable of turning an arch in brick-work. The floor requires many large iron-bars. On the other hand, a kiln in the form of an oblong ſquare, like that at Corbeil, will never heat equally in its whole extent, unleſs tubes be made to convey the ſmoke through various parts of the kiln, before it reaches the chimney, or there is a furnace at each end. All this is expenſive, and ſubject to inconveniencies.

Perhaps then a kiln ſomewhat reſembling a malt-kiln would do; and this might any where be built at a ſmall expence: ſuch a kiln need not be above eighteen feet ſquare, and eighteen or twenty feet high from the ground to the floor. Underneath the floor ſhould be a reverſed pyramid, ſomewhat obtuſe at bottom, to receive the funnel and tubes that are to give the ſupply of hot air: this may be made with quarter-ſtuff covered with lath and plaſter. This kiln does not require any large furnace. The new kiln at Corbeil is much larger taken from the ſecond ſtage to the bottom; yet has the heat been brought there to upwards of forty-five degrees. The floor of the kiln is to be made with joiſts eight inches by four, covered with laths, grating, or with hurdles as at Corbeil, where it has already laſted ſeven or eight years: there muſt be walls to ſupport the roof and beams, and it ſhould have two windows: there ſhould be a plaiſter-floor eight or nine feet above the grating, with one or more trap-doors, as they let out the ſteam much better than the windows: laſtly, the beams ſhould be plaſtered. There is reaſon to think that ſuch a kiln would coſt little, and anſwer the intended purpoſe. It ſhould have been obſerved, that over the grated floor ſhould be laid a large thin cloth, or rather a hair-cloth, riſing round the edges, and faſtened with nails: this is particularly uſeful when ſmall roots are dried, as it prevents their falling through. A foot above the roots may be put wooden traverſes, over which may be laid ſtraw-mats quilted on cloth: this will keep down the ſteam, and may be of great ſervice, as has been already obſerved.

The Furnace of this Kiln.

The Furnaces of the Liſle and Zeeland kilns are certainly neither of them proper for drying madder, any more than thoſe of the malt kilns: they have all the ſame defect, as they fill the kiln with ſmoke, which damages the roots. It was this inconvenience induced us to endeavour to contrive one that would give a great deal of heat without the above defect. This may be probably effected, by not letting the funnel be perforated, and carrying tubes from it which ſhould run under the madder before the ſmoke was diſcharged; and by having other tubes run near the fire, to circulate in the kiln a warm air, which they ſhould receive from without. We have made the trial of ſuch a furnace, and confeſs it did not yield ſufficient heat: the furnace ſhould certainly have been made larger, but the expence is a continual objection, which, beſides being conſiderable, is pure loſs to one that makes experiments for the public good, without being in a ſituation of reaping any profit from them. We ſhall cloſe then what we have to ſay on madder-kilns, by concluding, that malt-kilns ſeem well adapted to the purpoſe; but ſome method muſt be found to prevent the ſmoke damaging the roots.

Madder well dried and cleaned may be ſold in that ſtate to the dyers; but if is to be pulverized, there will be occaſion for a mill, which we ſhall now deſcribe.

Deſcription of a Mill, at Liſle *in* Flanders, *for pulverizing Madder.*

Plate XIX. Fig. 1. repreſents the part of a madder mill: it is inſulated, and covered only by a ſlight thatch. The figures 2, 3, 4, 5, and 6, are ſupplementary to the firſt: we muſt have recourſe to them in our explanation of the parts of the mill: they are therefore diſtinguiſhed by the ſame letters, and each piece is repreſented apart.

A is a lever, or pole, nine feet eight inches long, and ſix inches by four in magnitude. B, the axis of the wheel, ſix feet four inches ſix lines high, and nine or ten inches diameter. C, ſtays or knees, four feet ſix inches long, and four or five inches ſquare. D, the cogged wheel, three feet one inch ſix lines ſemi-diameter, and furniſhed with fifty-ſeven cogs.

The fellies, or circumference of this wheel, muſt be eight inches by four large: they are ſecured by an iron hoop. The traverſes are ſix inches by four thick, pinned and keyed. The cogs are made of apple-tree wood, and project three inches three lines: they are two inches and a half by two at their inſertion, and two inches and a half by one at top: and beneath the wheel they are two inches long, and one and a half ſquare: they act on the rounds of the trundle-head about one inch and a half of

of their length. The pins that faſten them are alſo apple-tree wood.

E is a beam twelve inches ſquare. F, the trundle head, thirteen inches ſemi-diameter, furniſhed with eighteen rounds, each a foot long, and two inches diameter; the ends of this trundle-head are two inches and a half thick, and hooped with iron. There are alſo two iron bars pinned on to ſecure the joints of the wood.

G is another axle-tree, or turning beam, eighteen feet ſix inches ſix lines long, ten inches ſquare near the trundle-head, and fourteen inches diameter in its octagonal part. H, lifters four inches nine lines long, five inches broad, two inches and a half thick. Hence it is apparent, that there are fifteen lifters inſerted into the axle-tree, to ſerve five beetles; that is three to each. For this reaſon the lifters, the catches, and the peſtles, are diſtinguiſhed by the ſame figure.

K, flyers four feet five inches long, and four inches ſquare: they are loaded with lead at their ends. L, catches, which anſwer to the lifters, H: they project five inches nine lines, and are five inches broad, and two and a half thick.

M, other catches inſerted into the ſides, or thickneſs of the beetles, N, and anſwer to the leavers. Q, N, beetles ten feet four inches long, and four inches ſquare. They are round at the ends next the mortars, and ſhod with an iron foot four inches diameter, which may be ſeen in figure 6. The beetles are numbered in this manner, 1, 4, 2, 5, 3, (Fig. 1.) to ſhew the order in which they play when the machine is in motion. O croſs-bars ſix inches by four, which ſupport the joints, P.

P, joints eight inches long, ſix wide and four thick. An iron pin, keyed, paſſes through each joint, and ſupports a moveable lever, Q, which acts on the catch, M. when the peſtle, N, is to be kept up. Q, levers, two feet three inches ſix lines long, three inches thick, by four wide.

R, keeps, ſix or eight inches wide to prevent the beetles from being diſordered. S, an upright poſt four inches ſquare, in which the croſs-bars and keeps are inſerted. T, mortars cut in a ſingle piece of wood ſixteen inches ſquare: they are eleven inches deep, and their greateſt diameter is ſeven inches: the bottom is lined with lead three or four lines thick.

V, a trough to prevent waſte, over which hangs a cloth, faſtened above to the keep, whilſt the mill is at work.

X, a beam twelve inches ſquare; this beam, and that at the other end, marked E, reſt on the timber work that ſupports the roof. The ſockets and pivots may be ſo well comprehended by the plate, that letters of reference were thought unneceſſary; the ſockets are braſs, the pivots ſteel.

We have purpoſely omitted giving the dimenſions of every part, to avoid confuſion; but the machine may be eaſily conſtructed by attending to the deſcription we have given, which is very exact.

But though the mill deſcribed above, is now actually employed in grinding or pulverizing madder at Liſle; yet it labours under ſeveral imperfections, which we ſhall endeavour to point out, and deſcribe a mill conſtructed in a more perfect manner.

There will be, however, no occaſion to deſcribe the wheel work of this mill, it being the ſame as that of Liſle: it will be ſufficient to give the proportion of the parts which compoſe it. The pole, or lever, from the center of the axis of the cogged wheel, to the part where the links of the ſpring-tree bar are faſtened, is nine feet long; the wheel is five feet ſemi-diameter, and has ſeventy-two cogs; the trundle-head is ten inches ſemi-diameter to the center of the rounds, and has twelve rounds; thus it makes ſix turns to one of the wheel. The horſe, going three feet in a ſecond, makes three rounds and a half in a minute, and the trundle-head twenty. The axle-tree having on its circumference three lifters to every beetle, each beetle makes ſix ſtrokes in a minute, and the four two hundred and forty in the ſame ſpace. The ſquare part of the axle-tree, on which the trundle-head is fixed, is made out of a piece of wood five inches ſemi-diameter; the other part of the axle-tree is larger, being ſeven inches ſemi-diameter. It is neceſſary it ſhould be ſo large, that the tenons of the lifters may have a proper length and thickneſs: it is much better to be round than an octagon, or any other faced form, as the mortiſes may be more regularly made. From the end of the lifters to the center of the axle-tree is twelve inches; ſo that in their motion they form a circle two feet diameter: the upper face of theſe lifters is cut in a curve, the radii of which are tangents to the circumference of the above-mentioned circle; the largeſt of theſe tangents is twelve inches, and determines the greateſt riſe of the beetles. By the lifters being thus curved, the reſiſtance is equal, at whatever height the beetles may be, as they are always in contact with the lifters at the ſame diſtance from their center of gravity. As there are on the length of the axle-tree twelve lifters in four parts, they form, one with the other, angles of thirty degrees, ſuppoſing them to be ſeen one behind the other, as if inſerted on the ſame plane: on this account, when the firſt beetle is raiſed to half its height, the ſecond is about to riſe; the firſt quitting the lifter, the third is on the point of riſing, &c. We ſay, on the point, becauſe we are to obſerve that the lifters go under the catches, or under that which ſupplies their place, five or ſix lines; and that the greateſt tangent of the curve, being twelve inches, is leſs, by near ſeven lines, than the ſixth part of the circumference of the circle, and gives the firſt beetle time to quit the lifter before the third riſes: this is neceſſary, that the power may never have more than two beetles to act upon.

The front of the frame-work is that ſide before which the axle-tree turns. The frame-work conſiſts of two beams, ten feet long, and eight inches ſquare: betwixt them, at each end, is a traverſe quarter, ſix inches by four. In the middle of the length and width of the beams, riſe two uprights, which are mortiſed and pinned: they are twelve feet eight inches high without their tenons, fourteen inches wide, and ſix inches thick, ſupported by a brace mortiſed into the front at the height of two feet, at the back part four feet and a half. Betwixt theſe two uprights is the block on which the beetles fall: it is made of a piece of dry tough elm, four feet and a half long betwixt the uprights, to which it is joined by a dove-tail two inches thick, and as much deep: it is twenty inches high, and eighteen broad: it reſts the whole breadth of its ends on the edge of the beams, and betwixt them, on three pieces of wood, at equal diſtances, that lie on the brick-work, which ſupports the whole. The block is divided croſs ways, by a partition two inches thick, parallel with the uprights, and of the ſame breadth, fixed

into

into the block by two tenons, and in a groove wide enough to receive its whole thickneſs; the ſame is obſerved in the back part of the firſt keep, which is fixed: the upper end is in like manner fixed to the upper keep: this partition divides the block croſs-ways into two troughs, each twenty inches long, formed by two ſloping planks; ſo that the troughs are four inches and a half wide at the bottom within, eleven inches and a half at the top, and twelve inches perpendicularly high: and to prevent the loſs of the light duſt that riſes in the work, the ſpace betwixt the edge of the troughs, and the firſt keep is boarded up; the boards at the back-part, as well as the ſides of the troughs there, are faſtened with grooves and dove tails into the uprights and partition; thoſe before lift up in a groove like a ſaſh, and are faſtened by turn buckles; the fronts of the troughs take entirely off; the pulverized root is taken out with a wooden ſpoon, and a feather broom, and they let it fall on a ſhelf before, which has a ledge four inches high: the fronts of the troughs are then put on again, and are filled with branch-madder; the ſliding-ſhutters are pulled down, and the peſtles are ſet at liberty to work, which had before been ſtopped whilſt the troughs were emptied; this takes but little time in doing, and the mill continues going during the time they gather up the root, and bolt or ſifts it. There are two keeps, which ſerve to direct the beetles: the under part of the firſt is three feet, and the under part of the ſecond ten feet: above the block they are three inches and a half thick; the firſt is made level in the front with the back of the groove, that the ſliding ſhutters may reſt on it when they are raiſed. Each keep conſiſts of two parts; thoſe at the back are let into the uprights, and pinned to them, and ſtrongly faſtened to the partition: thoſe in the front are made to take down, and put up, as occaſion ſerves; they ſlide in the grooves of the uprights, and thoſe that run along the middle of the partition: they have, beſides, two pins, by which they are kept in their places.

The beetles are, at the lower parts, twelve inches wide, eighteen inches high, and four inches thick; ſo that their face, or bottom, contains forty-eight ſquare inches: the upper part, or ſtock of each peſtle, is eight feet and a half long, four inches wide, and three thick; ſo that in the whole, they are ten feet long, without compriſing the cutters, which are four inches long, and formed like a carpenter's chiſſel; the blades of them are two inches and a half wide, and the tongues three inches and a half long: there are ſeventeen to each beetle. There are no catches, becauſe the lifters being in contact with their extremity, always at the ſame diſtance, five inches from the center of gravity of the beetles, the reſiſtance occaſioned by the friction of the ſtocks in the keeps, would have been very conſiderable. To avoid this inconvenience a mortiſe twenty-five inches long, and three inches wide, is made in the face of the ſtocks of the peſtles, ſtrengthened on the ſides by cheeks two inches thick. The upper parts of theſe mortiſes are ſix feet above the block; that is, on a level with the center of the axle-tree: this part is lined with a plate of copper, ſtrongly ſcrewed, well poliſhed, and rounded at the edge, to facilitate the fall of the beetles. On the ſide of the beetle-ſtock, ſixteen inches below the upper keep, are fixed catches a full inch thick, two inches high, and projecting four inches, to keep the beetles up while the troughs are emptying.

The levers, which ſerve for this purpoſe, are placed behind, and reſt on ſhoulders fixed on a piece of wood, which bears by its two ends on two brackets, mortiſed and pinned into the two uprights, and ſupported by braces: theſe pieces are ſix inches ſquare. The levers are made of quarter-ſtuff, ſix inches and a half ſquare, as well as the liſters of the axle-tree. The upper face of the ſhorteſt arm of the lever is rounded like the lifters, in a curve deſcribed by the original circle, the radius of which is the ſpace from the middle of the catch to the center of motion of the lever, which ſhould be parallel to the bottom of the catch. The radius of this circle, as well as the greateſt of the curve, ſhould be fifteen inches, that the beetle, being raiſed thirteen or fourteen inches, may not ſlip off. That the levers may be ſtronger, the wood muſt not be croſs-grained; and in the center of motion, it ſhould be traverſed by a ſquare iron bar, projecting two inches on each ſide: theſe projections, being rounded into pivots, reſt on the ſhoulders in braſs ſockets. A cord is faſtened to the ſhorteſt arm, and the end of it is faſtened occaſionally to wooden pins at the back of the block, to keep the levers ſomewhat lower than the catches, whilſt the beetles are at work. The longeſt arm leſſens by degrees towards the end, till it is reduced to a ſquare: at this part is fixed another cord, which is faſtened to the ſame wooden pins, when the beetles are to be kept up. The above deſcription, with figures on the copper-plate, will be ſufficient for an ingenious mechanic to conſtruct a mill of this kind, which will doubtleſs be of great advantage to this kingdom, as conſiderable quantities of madder are now planted, and ſome of it fit for uſe.

REMARKS.

The beetles of this mill weigh only one hundred pounds with their mounting; perhaps a few pounds more, which may be abſtracted by taking off a few inches of the lower part: there are never more than two beetles raiſed at a time, and one hundred and thirty-three pounds and a half for the power to act upon. A middle-ſized horſe is generally reckoned able to apply one hundred and eighty pounds of his ſtrength to move a machine, working for four hours together, and going three thouſand ſix hundred yards in an hour: he often goes faſter, but ſo was this mill calculated: there remains then forty-ſix pounds and two-thirds for the action, which is more than it amounts to in this machine: we may even venture to aſſert, that the friction of it is leſs than any other mill of the kind. A horſe may bear this work the better, as every five or ſix minutes there are two or three minutes reſpite to empty the troughs, and give them a freſh ſupply. This mill at Corbeil never pulverized above two hundred pounds of roots a day, becauſe that was all the kiln could ſupply it with; but the time in which this work was done, induces us to think it could eaſily pulverize four hundred and eighty, or five hundred pounds. They ſay that the Liſle mill can pulverize five hundred pounds in twenty hours: we ſcarcely believe it, eſpecially as we imagine it does not work in the night: thus we muſt ſuppoſe it really works only ten hours, like that at Corbeil. Be it as it may, the work of theſe mills ſhould be calculated by the weight of their beetles, the number of blows they ſtrike in a minute, and the ſuperficies of their baſes; that is, the Corbeil mill is to that of

Liſle, as four hundred pounds, the weight of the four beetles multiplied by two hundred and forty, the number of blows they ſtrike in a minute, and the product by one hundred and ninety-two, the ſuperficies of the baſes of the four beetles, is to three hundred and eighty-five, the weight of the five beetles, multiplied by one hundred forty-two and a half, the number of blows they ſtrike in a minute, and the product by ſixty-three, the ſuperficies of the baſes of the five beetles; or, after the numbers are reduced, as ſixteen is to three; by which it appears, that if the Corbeil mill pulverizes five hundred pounds in twelve hours, that of Liſle ſhould pulverize no more than one hundred.

The indifference they diſcover in Flanders, with reſpect to the ſituation of the kilns and mills, is worthy of blame: they are, it is ſaid, in ſeparate buildings, which have no communication: nothing can be more inconvenient. It is well known at Corbeil, that the root, which they ſome time ago pulverized in a little hand-mill, fixed in a barn, ten or eleven yards from the kiln, which had no influence to warm it, grew damp, and clogged under the cutters, by which it was much damaged. This work is always done in winter, and it is ſcarcely poſſible it ſhould be otherwiſe: the fogs muſt therefore be guarded againſt.

The kiln we have recommended would contain four thouſand pounds weight of green madder, which would yield five hundred pounds of dry root when it had been there forty-eight hours: the mill can pulverize this quantity in a day. If one had a very conſiderable crop, for inſtance, four hundred thouſand pounds, which would yield fifty thouſand pounds of dry root, and this is as much as the mill could turn out in four winter months, working every day, it would be neceſſary to have two kilns. The buildings to contain the kilns and mill might be diſpoſed nearly in the following manner. A building ſhould be erected ſixty-three feet long, and twenty-one wide, with a floor twenty or twenty-two feet from the ground, which ſhould be a ſtore-room for part of the green root: the under part ſhould be occupied by the mill and its frame-work, ſo that at each end there would be a ſpace of eighteen feet to the walls at the extremities: in the middle of this ſpace the apertures of the furnaces to heat the ſtoves ſhould be made, which ſhould be ſo ſituated, that the floors of the kilns ſhould be on a level with that of the ſtore-room: trap-doors might be contrived in the floor of the ſtore-room, to throw the dried roots down; and as they ought to be kept dry till they go to the mill, they may be heaped round the furnace under the reverſed pyramids of kilns; for they ſhould be kept dry till they are barrelled up.

On a ſuppoſition that the produce of four hundred thouſand pounds might be pulverized in the four winter months, ſome place ſhould be provided to keep it in proper order till the laſt went to the kiln: it muſt be ſpread at moſt two feet thick, that it may every day be turned. Experience convinces us, that eight cubic feet of green root weigh one hundred pounds. The ſurface of the granary will give one thouſand three hundred and twenty-three ſquare feet, which, divided by four, give three hundred and thirty quintals and a quarter, or thirty-three thouſand ſeventy-five pounds; but this does not come near four hundred thouſand pounds. It is preſumed, the beſt way would be to erect ſome large building four or five ſtories high, which might altogether contain, at leaſt, twelve times as much as the ſtore-room above-mentioned; but this expence might be ſaved, if the root could be taken up in ſmall quantities during the autumn, winter, and part of the ſpring.

Explanation of the Figures of the Corbeil *Mill.*

Fig. 4. Plate XVIII. is the frame-work of the mill ſeen in the front: Fig. 3. is the ſame frame-work ſeen end-wiſe, the upright and beam being taken off.

A, beams, eight inches ſquare, ſeen end-wiſe (Fig. 4.) and the length of one of them, which is ten feet (Fig. 5.)

B, traverſe quarters, which are fixed into the beams; the length of one of them is ſeen (Fig. 4.) and the ends of both are ſeen (Fig. 5.) they are ſix inches by four.

C, a flooring or ſtage, laid on the grooved edge of the beams and the traverſe quarter.

D, uprights, fixed to the beams: their thickneſs may be ſeen (Fig. 4.) the top of one of the uprights only is perceivable (Fig. 5.) over the upper keep, N; and the breadth of the bottom is diſtinguiſhed by two pricked lines on the end of the block which covers it, as the remainder of it is concealed by the middle partition. Theſe uprights are twelve feet eight inches high, ſix inches thick, fourteen inches broad, as high as the axle-tree, then reduced to ten inches.

E, braces which keep the uprights ſteady on the beams; thoſe in the front are mortiſed at the height of two feet, thoſe behind at four and a half: they are ſix inches by four.

F, the block, on which the beetles fall; it is made of elm, four feet and a half long betwixt the uprights, and twenty inches high by eighteen broad: it has at each end a dove-tail two inches thick, and as much deep, which goes into the grooves of the uprights.

G, a ſhelf, level with the upper part of the block, of the ſame length, twelve inches wide, two inches thick, and a ledge four inches high: it reſts on a groove at the edge of the block, and on the brackets H, Fig. 4 and 5.

J, three pieces of wood, which ſupport the block.

K, the brick-work, which is the foundation of the frame-work.

L, a partition which divides the block into two parts: it reaches from the block to the upper keep; it is two inches thick, and the ſame breadth and ſhape as the uprights: it has on the front, and two ſides next the uprights, grooves which run up till it begins to narrow; there are other ſimilar grooves in the uprights. This partition conſiſts of two parts: the lower part is fixed in a groove of the block, and above with a tenon, and is beſides pinned to the back part of the firſt keep, which is fixed: the upper part is tenoned into the upper part of the firſt keep, and the under part of the ſecond: they go into grooves that croſs the whole breadth of the front parts of the keeps, which are moveable.

M, troughs in which the roots are kept: they are four inches and a half wide at bottom, eleven inches and a half at top, and twelve inches perpendicularly: they conſiſt of two boards ſloping before and behind (Fig. 5.) the ſpace between their edges and the firſt keep is boarded up. In the front *d*, are ſliding ſhutters. The front of the troughs take off. In Fig. 4. is ſeen one of the troughs open, and the ſliding ſhutter puſhed up: two of the beetles are alſo viſible, one quite, the other half raiſed.

N, are keeps, three inches and a half: their breadth conſiſts of two parts: thoſe behind are entirely fixed to the uprights: they are ſeven inches broad, notched half the thickneſs of the ſtocks of the beetles, in the parts where they paſs: the other two pieces take off at pleaſure, and are notched in the ſame manner to give the beetles room to work: they have each of them two keys, or tongues, four inches broad, four long, and one thick, which go into mortiſes in the fixed part of the keep, between the ſtocks of the two beetles belonging to each trough, where they are faſtened by two large pins, *g*. They ſlide on the grooves of the uprights: the undermoſt is ſix inches broad, that the ſhutters may ſlide over it: the uppermoſt is four inches, conſequently projects an inch: the edges are rounded off. The under part of the firſt keep is three feet above the block; the under part of the ſecond, ten feet.

O, beetles, ten feet high: they are twelve inches broad at bottom, to the height of eighteen inches (Fig. 4.) four inches thick (Fig. 5.) with a ſtock eight inches and a half long, and four inches broad, by three thick. At an inch above the firſt keep, they are left ſeven inches broad, for thirty-ſeven or forty-eight inches, to make room for a large mortiſe, *h*, twenty-four inches long, and three inches wide. The upper part of the mortiſe is lined with copper, the angle being rounded off. Sixteen inches below the ſecond keep, there are, on the ſides of the ſtocks catches, *i*, two inches high, an inch thick, and projecting four inches. The bottoms of the beetles are ſecured with an iron band, *m*, one inch and a half broad, and four lines thick, and armed with ſeventeen cutters, *n*. The order in which they are placed may be ſeen in Fig. 7. and the ſhape of them in Fig. 8.

P. (Fig. 4) is a bracket ſix inches ſquare, with its brace, both mortiſed and pinned into the upright (Fig. 5.) There is another on the other upright, not viſible in Fig. 4.

Q, (Fig. 4.) a piece ſix inches ſquare, fixed to the brackets. The end of it might have been ſeen in Fig. 5. but it was not pointed out, to avoid confuſion.

R, ſhoulders, reſting on, and pinned to the piece Q, notched at *o*, to receive the leaves, Fig. 4. alſo at *p*, Fig. 5. to receive their pivots.

S, levers which ſerve to raiſe the beetles, and keep them up while the troughs are emptied: they reſt on ſhoulders, R, where they play: they are made of a piece of even grained wood ſix inches broad, and two inches and a half thick: the length of the ſhorteſt arm is fifteen inches; that of the longeſt ſixty inches. The center of the point ſhould be on a level with the under part of the catches. At the extremity of the long arm is faſtened a cord, *g*, which is fixed to the pins, *r*, in the block, when the beetles are raiſed thirteen or fourteen inches. Another cord, *s*, is faſtened as near as poſſible to the end of the ſhort arm, which is tied to the ſame pins *r*, when the beetles are at work.

T, the turning axle-tree, ſeen endways, Fig. 5. and in front, Fig. 6. It is round, and fourteen inches diameter. It is furniſhed with twelve lifters, on four planes, ſo diſpoſed, that, when it is at work, the lifters anſwer the mortiſes, *h*, Fig. 4. by which they raiſe the beetles, without touching the ſides: they may all be ſeen in Fig. 5. Thoſe that are on the ſame plane, are diſtinguiſhed by the ſame figures, 1, 2, 3, 4, as well as here in Fig. 6. They are made out of pieces of wood, ſix inches broad, and two inches and a half thick: their tenons, X, Fig. 5. are two inches and a half by two, and as long as poſſible, without touching in the center of the axle-tree. From the center of the axle-tree, to the point of contact of the levers with the mortiſes, *h*, is twelve inches: this point is five or ſix inches under the mortiſes. Great care muſt be taken, that the tenons of the lifters be not made of croſs-grained wood.

V, V, (Fig. 7.) the baſe of a beetle, to explain the manner of placing the cutters, which are repreſented by black lines, as if only their edges were ſeen. The pricked lines make the diviſion of the ſuperficies to arrange them.

Y, (Fig. 8.) one of the cutters, marked *n*, Fig. 4, and 5. The height from the upper part of the ſhoulder to the edge, is four inches; the tongue three inches and a half; its largeſt part half an inch ſquare; the ſhoulder about eighteen lines diameter: the edges twenty-ſeven lines broad; they ſhould be ſteeled and ſhort.

The Fig. 7. and 8. are drawn by a ſcale, four times as large as the reſt, that their parts might be the better diſtinguiſhed.

MADS, earth-worms.

MAIZE, a ſpecies of grain ſo generally uſed for food in America, that it has obtained the name of Indian corn.

The ſize of its ear differs greatly, according to the fertility of the ſoil, and the warmth of the climate in which it is cultivated; but, at a medium, it is about a ſpan long, and commonly has eight or more rows of grain, each of which uſually contains upwards of thirty ſeeds, of various colours, as red, white, yellow, blue, olive, greeniſh, blackiſh, ſpeckled, ſtriped, &c. ſometimes in the ſame field, and the ſame ear: but the white and yellow are the moſt common: nor does this diverſity of colours ever reach beyond the outſide of the grain, the flour of which is always white, with a little tinge of yellow. Theſe ſeeds, which are as big as large peas, are round at the outer ſurface, very ſmooth, and ſet extremely cloſe, in ſtraight lines. The ear is clothed and armed with ſeveral ſtrong thick huſks, which defend it not only from unſeaſonable rains, and the cold of the night; for it does not ripen fully in ſome places, till towards the latter end of September, but alſo from crows and other birds, which being allured by the ſweetneſs of the grain before it hardens, flock to it in great numbers, ſuck through the top of the outer covering, and devour as far as they can reach. In the northern colonies, the ſtalk of this plant, which contains a remarkably ſweet pith, and is jointed like a cane, does not grow near ſo high as in the ſouthern parts. It has long leaves, almoſt like flags, at every joint, and at the top a bunch of flowers, of various colours, highly pleaſing to the eye. The northern Indians, far up in the country, have a ſpecies of this grain, called Mohawk's corn, which never grows high, and, though planted in june, ripens in due ſeaſon. The general time of planting it, is between the middle of March and the beginning of June, or, more particularly, from the middle of April to the middle of May.

Mr. Ray was of opinion, that there are only two really diſtinct ſpecies of this plant; but Mr. Miller is certain there are three, which do not alter by culture, and he enumerates them in the following manner:

"The firſt of theſe, with yellow grains, grows naturally in the iſlands of the Weſt-Indies, and has a very large ſtrong ſtalk, which riſes to the height of ten or twelv

twelve feet. Its leaves have a broad white mid-rib, are long, broad, and hang downward. The male flowers (for maize has both male and female flowers, ſituated at remote diſtances on the ſame plants) come out in branching ſpikes at the upper part of the ſtalks, and are from eight to ten inches long. The female flowers come out from the bottom of the leaves on the ſide of the ſtalk, and are diſpoſed in a cloſe, long, thick ſpike, which is covered cloſely with their leaves: out of the end of this cover hangs a thin long bunch of filaments or threads, which are ſuppoſed to convey the *farina fœcundans* of the male flowers to the germ of the female. When the ſeeds of this ſort are ripe, the ſpikes or ears are nine or ten inches long, and ſometimes a foot: but theſe rarely ripen in England.

"The ſecond ſort, which has white grains, is cultivated in Italy, Spain, and Portugal. The ſtalks of this ſpecies are ſlenderer than thoſe of the former, and ſeldom riſe more than ſix or ſeven feet high. Its leaves are likewiſe narrower, are hollowed like the keel of a boat, and their tops hang downward. The ſpikes of the male flowers of this are ſhorter than thoſe of the former ſort, and the ears, or ſpikes of grain are ſlenderer, and not more than ſix or ſeven inches long. The grains of this ſort do not come to maturity in England, unleſs the ſeaſon proves very warm, and they are planted early in a warm ſoil and ſituation.

"The third ſpecies, which has a yellow and white ſpike, is cultivated in the northern parts of America, and alſo in Germany. The ſtalks of this are ſlender, and ſeldom riſe more than four feet high. Its leaves are ſhorter and narrower than thoſe of the two former, are hollowed like the keel of a boat, and their tops hang down. The ſpikes of the male flowers of this ſort are ſhorter than thoſe of the others, and the ears, or ſpikes of grain, are ſeldom more than four or five inches long. This ſort ripens perfectly well in England, in as little time as barley, and therefore may be cultivated here to advantage."

This plant is ſeldom cultivated in England for uſe, though it might probably turn to good account, as was lately experienced by a gentleman in Lincolnſhire, who planted this corn in an open field, where it ripened perfectly, and yielded an abundant crop; but very great quantities of it are raiſed in Aſia and Africa, in ſeveral parts of France, in Italy, Germany, and North America; its culture in the latter is given in the following manner, by a very worthy and ingenious gentleman of that country, who ſpeaks from his own knowledge.

"The Engliſh in North America plough the ground thoroughly before the grain is planted. They ſeldom, if ever, dung the whole face of the field, but ſometimes put a little dung in each hill of corn, if they think the ground requires it. Where fiſh are plenty, in the planting ſeaſon, they put two or three ſmall fiſh into each hill, with the grain.

"In order to plant the corn, they make trenches, or furrows, with a plough, croſs theſe with others of the ſame diſtance, which divide the field into ſquares; and where the trenches interſect, the grain is put in and covered. Three or four grains are commonly planted for each hill. The intermediate ground is afterwards ploughed at leiſure, as the plants grow, and want more looſe earth for the roots to ſpread in. The hills are made at the time of weeding; ſome looſe earth being then hoed up over the roots, and round the ſtems or ſtalks of the corn.

"The corn is planted at different diſtances in different places. In the northern colonies, the Indian corn grows low; ſeldom exceeding four or five feet in height; and the leaves being proportionably ſmall, the plants do not require ſo much ground as in the ſouthern colonies, where they frequently riſe to fourteen or fifteen feet. The ſpace generally allowed for the loweſt plants, is three feet, and for the higheſt five or ſix. This diſtance may be more neceſſary in our manner of cultivating this corn; more ground being required to nouriſh three or four plants than one; for I do not know that we ever pluck up any of the plants. An advantage attending this method is, that the labour is leſs in hilling; three or four plants being earthed up in the ſame time as one; and there is more room for paſſing between the rows when the corn is to be weeded.

"At the ſame time that the corn is weeded, the ground is looſened round the plants, with a hoe, and the hills are raiſed and enlarged from time to time, by adding more earth. The morning, before the dew is off, and the evening are reckoned better for this work than the middle of the day.

"The hilling of the corn, as it grows, has been the univerſal practice: the deſign being to give the plant more nouriſhment, and to ſupport it better againſt the winds: but of late, ſome planters have thought it better to plant in holes: the reaſon is, that this plant requires a good deal of moiſture; and indeed nature, by the form and poſition of the leaf, appears to have intended the receiving of the rain that falls around, and conducting it to the ſtalk, and by that down to the roots: but a hill round the ſtalk, tends to throw the water off to a greater diſtance: and as to ſupporting the plants, they ſay the hills do not effect it, becauſe, by covering the ſtalks in that part from the air and ſun, which would harden and ſtrengthen them, the mould around them keeps them ſoft and tender, and thereby rather weakens them.

"The panicles, or toſſils, contain the *farina fœcundans* of the plant, and therefore ſhould not be cut off till the grain in the ear is filled. If the toſſils of a whole field ſhould be cut off before that time, there would be no grain at all in the ears. This has been proved by experiment.

"In the more ſouthern colonies, where hay is ſcarce, and the leaves of this corn are very large, they cut them off for fodder: but in the northern colonies, where there is plenty of hay, and the leaves of the corn are ſmall, they generally neglect cutting off the toſſils, and ſtripping off the leaves. They are left on the ſtalks, and the cattle, being turned into the fields, after the corn is gathered in, eat what they like of them: but they are not eſteemed ſo good as what has been cut in ſeaſon.

"An eaſy way of taking the grain out of the ears is, to rub one againſt another, holding one in each hand.

"When the ears are ſtript of their huſks, they are reckoned in the beſt ſtate for preſervation; much better than when the grain is rubbed off from the ear: for then, they ſay, inſects can get at the ſoft part of the grain, and eat into it, which they cannot do while the ſoft part is connected with the cob in the ear, and the hard flinty part of every grain turned outward, and the grains cloſe to each other.

"To preſerve this corn, they make in North-America a ſort of bins, or cages, which they call corn-cribs,

fifteen or ſixteen feet long, and five or ſix wide, widening upwards to the top a foot or more. They are made of ſapling poles, three or four inches diameter, framed roughly together, by notching the ends where they croſs the corners, at ſuch a diſtance from each other, as but juſt to keep the ears from falling through, that there may be a free paſſage for the air. Theſe bins ſtand abroad, and have a ſlight moveable covering, or thatch, to keep out the rain. The Indians bury their corn in holes in the ground, lined with mats and dry leaves.

The manner of uſing this corn in America, is various. It has this advantage over wheat, that ſubſiſtence may be drawn from your corn-fields long before the general harveſt: for the green ears roaſted, are delicate food; and as the corn ripens and grows harder, the ears boiled are good eating, with butter and ſalt. When it is ripe, the corn parched and ground into meal, is the hunting and war proviſion of the Indians, being light to carry, and affording good nouriſhment. They mix a little of it with water, and it needs no other cooking, having already paſſed the fire in the parching. The grain ſoaked in water, will part with its ſkin when beat in a large mortar with a wooden peſtle: then it is boiled, and eaten with milk. Being pounded coarſely, dry, it is alſo boiled and eaten as rice. Bag puddings, and baked puddings made of it properly, are very good. The meal is alſo boiled with water, to make what they call a haſty pudding, which they eat with butter and ſugar, or with milk. This haſty pudding, or boiled meal, being mixed with twice as much dry wheat flour, and worked into loaves, makes much better and pleaſanter bread than flour alone. All creatures fed with Indian corn, have firm and fat fleſh: the pork of corn-fed hogs, is reckoned the fineſt in the world for taſte and goodneſs; their fat is milk-white, and as hard as butter. The horſes of Virginia and Maryland, whoſe chief fodder is the leaves and ſtalks of this corn, are reckoned the hardieſt of the ſpecies, bearing moſt labour, and requiring leaſt care; and the people of thoſe countries where it is the common food of men, are healthy, ſtrong, and hardy."

This corn is thought to keep better than wheat, and has frequently been of infinite ſervice in many countries in times of ſcarcity of other grain. It anſwers all the purpoſes of the white pea, of about the ſize of which its grains are, and would certainly be a better ſubſtitute for the poor, than bean-flour, or ſome other ſorts, which have been uſed even in England, where maize may doubtleſs be cultivated to advantage in light ſandy lands, in which beans and peas do not thrive well. It is excellent for feeding poultry, either given whole to the larger ſort of fowls, or broken a little for the ſmaller. The Breſcians, in particular, who are remarkable for the fatneſs of their capons, uſe a great deal of it for this purpoſe. The Indians reckon it a good remedy in all acute diſorders; and it has been obſerved, that thoſe people are very little ſubject to the ſtone, which ſome aſcribe to their living upon this corn. They extract from its ſtalk, when green, a ſweet ſyrup, which anſwers all the ends of ſugar; and when the ſtems are diveſted of their ears, and dried, they make excellent fences, coverings of ſheds, &c.

The Indians, and ſome Engliſh, particularly where the ground is good, and has been well manured with fiſh, plant with the maize, in every corn hill, a kind of French beans, which run up the ſtem of the corn, and are ſupported by it: others plant potatoes, gourds or pumkins and others again ſow turnips, in the intermediate ſpaces between the hills.

Some curious perſons, by way of experiment, have planted ſeeds of only one colour in the ſame field, without any other coloured ſeeds near them, and their produce has been entirely of the ſame colour: but when the rows have been planted alternately with grains of different colours, they have interchanged, and produced a mixture of all the ſorts in the ſame row, and frequently, as was ſaid before, on one and the ſame ſpike. It is even affirmed, that they will mix with each other at the diſtance of four or five rods, if no tall fence or building ſtands between, ſo as to intercept their communication.

Mr. Miller, who mentions this, very rightly recommends the horſe-hoeing huſbandry, as, in all reſpects fitteſt for the culture of maize; and gives the following as a method in which it has ſucceeded beyond expectation.

The land, which was very light and ſandy, and far from being rich, was ploughed deep before winter, and laid up in high ridges till the ſpring, when it was broken fine with the harrow. It was ploughed again in April, laid level, harrowed ſmooth, and then ſowed in drills four feet aſunder, into which the ſeeds were dropped at the diſtance of about eight or nine inches from each other. When the plants were about three inches high, they were thinned with a hand-hoe, by cutting up ſome of them where they grew too cloſe, and the intervals between the rows were ploughed ſhallow, to deſtroy the young weeds: but when the ſtems were advanced, the ground in the intervals was ploughed deep, and the earth laid up to the plants on both ſides; and when the weeds began to grow again, a third ploughing was given, to deſtroy them. This kept the ground pretty clean from weeds till the corn was ripe, as the ſeaſon did not prove wet; for otherwiſe a fourth ploughing would have been neceſſary. Each of the ſtalks of theſe plants produced from three to ſix ſpikes of grain.

Sir Richard Bulkley, who planted ſome of this corn in Ireland, from ſeed which grew in Brandenburgh, had, from each of his grains, which were ſet a foot aſunder in rows about a yard diſtant from each other, from three to ſix ſtems, and upon each ſtem three ſpikes or ears of corn, with two hundred and forty grains in each ſpike. An amazing increaſe!

Some good huſbandmen in France, have cultivated this grain upon nearly the ſame principles as thoſe which Mr. Miller points out. The little differences in their methods may not be uninſtructing: for which reaſon we ſhall here give the ſubſtance of M. Duhamel's account of their management of this corn.

"Maize thrives better in a light and ſandy ſoil, than in ſtiff and clayey land. It cannot do without dung; and the ground intended for it ſhould receive two good ploughings in March. A third ploughing, which is given towards the end of April, makes the furrows for the ſeed; and what clods remain after this, are broken by hand, the furrows then preventing the uſe of a harrow.

"A fine clear day is choſen in May, to ſow the ſeed, which is done by making at the bottom of the furrows, with a ſtick or other inſtrument, ſmall holes, into each of which two grains of maize are dropped. The furrows are a foot and a half aſunder; and the holes, at

the ſame diſtance from each other, are diſpoſed in ſuch manner that they form a kind of quincunx.

"When the corn is riſen, the weakeſt of the two plants is plucked up, where both ſeeds have ſprung; and where neither of them had grown, two new grains are planted.

"Towards the middle of June, the ground is hand-hoed round each plant; and as they ſtand in the bottom of a furrow, the mould which crumbles down, from time to time, lays freſh earth to their roots, and helps to ſupport them. About the end of July, a ſlight hoeing is given them, which is the laſt; and in ſo doing the earth is laid toward the roots of the plants.

"The panicles of the male flowers, which grow at the top of each plant, and are well known not to contain any grain, are cut off about the middle of Auguſt. But care muſt be taken that the grain be impregnated before they are cut off; which may be known by the then turgid appearance of the outward covering of the ears: nor ſhould the panicles be cut off from all the plants at the ſame time; becauſe ſome of the ears are not impregnated till a fortnight after others. Theſe panicles are excellent food for cattle. When they are cut, or ſhortly after, all the leaves are ſtripped off the ſtalks, together with all the blighted and ſmutty ears: for it is ſaid that the good ears would not grow ſo large, nor the grains be ſo well nouriſhed, if they ſhould be left upon the ſtalks. All theſe leaves and ears are given as fodder to oxen; and it is remarkable, that thoſe creatures are fonder of the ſmutty ears than of all the reſt.

"The time for reaping maize is towards the end of September. The ears are then gathered by hand, and put into baſkets, in which they are carried and laid in heaps from ſpace to ſpace in the field; after which they are loaded in carts, carried home, and ſpread upon an even floor prepared for that purpoſe. They are then taken out of their ſheath or hood, and dried in the ſun before they are laid up in the granary; or elſe the grain is taken out at that time. Maize which has been well dried in the ſun will keep ſeveral years, and not be the leſs fit for ſowing. The granary ſhould be very dry, and the corn laid up in it ſhould be turned at leaſt every three months, to prevent its growing muſty, or being attacked by inſects.

"There are two ways of taking out the grain. The firſt, which is the moſt expeditious, is by threſhing it with a flail: but in this method a great deal of the corn is broken or bruiſed. The ſecond, and more common, is by rubbing the ears hard againſt the edge of a flat piece of iron. This eaſily ſeparates the grains from the ſpike, or cob, without hurting them, and this remainder of the ear is very good food for oxen.

"As ſoon as the ears are gathered, the ſtalks remaining in the ground are plucked up, and laid by for winter fodder, for oxen. The field is afterwards ploughed up as ſoon as poſſible: it being the general opinion of farmers, that the roots of the maize would otherwiſe continue to ſuck up the rich particles of the earth. Whether this be true, or not, their notion is, that if this ploughing ſhould be deferred, the next year's crop would certainly ſuffer by it.

"When maize is planted only for fodder, particularly of cows and oxen, it is ſowed very thick, and harrowed in, or covered with a rake, in a good ſoil, which has been ploughed twice, and well dunged: but it is obſerved, that in theſe thick ſowings, all the female flowers are barren, and produce no grain: and it likewiſe is ſo great an impoveriſher of land, that though the ground be dunged every time it is planted, wheat never does ſo well where this corn has grown, as in the neighbouring fields where it never was."

M. Aimen, M. D. in the province of Guyenne, where great quantities of this corn are raiſed, obſerves to M. Duhamel, 1. That it is important to ſow maize rather in the beginning than at the latter end of May; becauſe, if it is ſowed early, the plants will have acquired ſufficient ſtrength before the great heats, to ſhoot out then with vigour; nor will their ears be burnt, or liable to that barrenneſs to which they are ſubject when this corn is ſowed late; beſides which, the ſtalks will be ſtronger, and their ears larger and fuller of grain. 2. That the ears of maize are greatly hurt by cutting the panicles too late; and that they ought to be cut before the hoods are open. By leaving a plant with its male flowers at every twenty feet diſtance, all the female ears will be impregnated.

In two different, but ſucceſſive years, this gentleman ſingled out two rows of maize, the plants of which ſeemed to him equally ſtrong. He cut off the panicles of the male flowers of all the plants in the firſt row, before their hoods opened, and let the panicles of the other row remain till the uſual time of performing this operation: the conſequence was, that the female ears of the firſt row were much the largeſt and beſt filled with grain.

He likewiſe ſowed a row of maize at a diſtance from any other field planted with that corn, and cut off the panicles of that row before the hoods were opened; leaving only one plant with its male flowers at every twenty feet diſtance. At harveſt, he obſerved, 1. That all the female ears of all the plants were impregnated. 2. That the female ears of the plants which had loſt their male panicles early, were thicker, longer, and fuller of corn than any others. 3. That the female ears of the plants whoſe panicles had been cut late, were ſmaller and ſhorter, and that in ſome parts of them the grains were abortive.

To ſatisfy himſelf whether it be beſt to ſow maize thick, or thin, he planted three different ſpots of ground with this corn, on the third of April 1753. The ſeed uſed for the firſt, where the grains were placed about a foot and a half aſunder, according to the common practice of the country, in which experience had inſtructed the huſbandman, weighed one ounce and one penny-weight: the ſecond, in which the grains were only a foot aſunder, was ſowed with two ounces and two penny-weights of ſeed: and the third, in which they were but ſix inches apart, was ſowed with four ounces and a half. The firſt of theſe ſpots produced eighteen pounds and four ounces of grain: the ſecond fifteen pounds ſeven ounces: and the third, eleven pounds two ounces. A manifeſt proof, as M. Duhamel obſerves, that ſome ſorts of grain will not thrive unleſs they are ſown very thin; and that, for want of this precaution, a great deal of corn is often loſt, and the crops are conſiderably diminiſhed.

As maize is a large plant, and requires much nouriſhment, it would certainly be right to try the culture of it with the horſe-hoe: to this end, it will be proper to plant the rows two feet aſunder, and the grains in them twelve or fourteen inches apart. All the neceſſary hoeings may then be given with the cultivator drawn by one horſe; and I believe, with Mr. Miller, M. Aimen, and M. Duhamel, that the corn will thrive the better for it, and the

land

land be afterwards fitted for other grain. It is worth the while of thoſe who live in the countries where maize is cultivated, to try what will be the effect of this method.

MALANDERS, cracks in the bend of a horſe's knee, that diſcharge a ſharp indigeſted matter; they are often the occaſion of lameneſs, ſtiffneſs, and the horſe's tumbling.

This diſtemper is cured by waſhing the parts with a lather of ſoap warmed, or old chamber-lye; and then applying over the cracks a ſtrong mercurial ointment ſpread on tow, with which they ſhould be dreſſed, night and morning, till all the ſcabs fall off: if this ſhould not ſucceed, anoint them night and morning with a little of the following, and apply the above ointment over it.

> Take of Æthiops mineral half an ounce; white vitriol; one dram; ſoft green ſoap ſix ounces: anoint with this often, but firſt clip away the hair, and clear the ſcabs. On their drying up, it may be poper to give a gentle purge or two; or the nitre-balls may be taken advantageouſly for a fortnight or three weeks. *Bartlet's Farriery.*

MALT, is barley prepared, to fit it for making a potable liquor called beer, or ale, by ſtopping it ſhort in the beginning of vegetation.

It is ſaid, that the ſoil on which barley grows makes a conſiderable difference in the grain, and that the barley fitteſt for malt is that which grows on a rich, light, or gravelly ſoil, and which has been raiſed from ſeed brought from a farm of a different ſoil and ſituation. The fulleſt and largeſt grains of ſuch a crop ſhould be choſen for making malt. It ſhould be heavy and perfectly ſound, and ſuch as has not ſuffered any accident in the field. Its being a little heated in the mow, is by ſome reckoned an advantage, becauſe the grain will be the more equally dried, and will conſequently the more equally imbibe water. If it has been ſo much mow-burnt as to look blackiſh when broken at the root end, or, as Mr. Combrune ſays, if it has ſuffered a heat of 120 degrees, it is unfit to make good malt. It is alſo found by experience, that barley taken immediately from the field does not malt ſo kindly as that which has been ſome time in the houſe, or mow. Special care ſhould be taken that it be free from the ſeeds of weeds; for theſe, in the malting, are apt to give the grain a bad taſte, which cannot be afterwards got rid of.

By germination, all the principles of barley are put in action. The heat which it undergoes in malting ſeparates and divides its parts; and the viſcidity which it before poſſeſſed is removed by the looſer texture of its oils, and their intimate union with the ſalt, which gives malt the ſweetiſh taſte that diſtinguiſhes it from barley.

In order to its being malted, the barley is put into a ciſtern lined with lead or ſtone, and covered with water about ſix inches deep above the barley, to give room for its ſwelling. All the good grain will ſink in the water; but, after ſtirring it, the imperfect, or diſtempered grains will riſe to the ſurface. Theſe ſhould be ſkimmed off, and given to poultry, or hogs, for they will never make good malt. By the water's gaining admittance into the barley, a great quantity of the air is expelled; as appears from the number of bubbles which riſe on the ſurface.

The barley is left in the water two or three days, more or leſs, in proportion to the heat of the weather and the dryneſs of the barley. A judgment is formed that grain is fully ſaturated with water, from its appearing turgid, and eaſily giving way to an iron rod dropped perpendicularly into it. Or, take a corn from the middle of the ciſtern, and hold it ſteadily, by the two ends, between the fore-finger and thumb: preſs it gently, and if it continues firm when ſo preſſed, and the ſkin does not break, it muſt ſoak longer: if it cruſhes together and feels mellow, and the ſkin crack, it is watered enough. Nicety in this is a material point, and can be learnt only by experience. If the grain ſhould be ſuffered to remain too long in the water, it would begin to loſe part of its ſweetneſs. When it has been ſteeped ſufficiently, the water is drawn off.

The water uſed for this purpoſe ſhould be that of a clear running ſtream, or rain-water; or, if ſuch cannot be had, pond-water, provided it be ſweet and clean, will do very well; or pump-water, which ſhould be rendered ſoft, if it be naturally hard. If the water made uſe of is any way tainted, it communicates to the malt a taſte which it never loſes. Mr. Combrune adviſes the adding of lime to the water in which the barley is ſteeped: but this ſeems to be improper, becauſe it appears from Dr. Home's experiments that lime renders water hard.

From the ciſtern, the barley is laid in a regular heap, or couch, where it muſt remain thirty hours, or till it contracts a heat. It muſt then be worked in one or more heaps, and turned every four, ſix, or eight hours, according as the weather is cold or hot. When it begins to ſpire, it ſhould be turned every three or four hours, according to the temperature of the air; and as it comes (for ſo its ſpiring is commonly termed) the heap muſt be ſpread thinner to cool it, leſt it be heated too much, and the germination be carried on too faſt, by which the oils would be too much conſumed. The turning of it muſt be continued in proportion as it is more or leſs ſlow in growth, ſo that it may be brought tolerably dry to the kiln. When the roots begin to deaden, the couch muſt be thickened again, and often turned, that the growth of the roots may not revive. At this time, the ſpire ſhould be near piercing through the outer ſkin of the barley: for if it grows quite out, the ſtrength of the malt will be too much conſumed. After the malt is made thus far, the common practice is to lay it at once on the kiln: but the beſt way is to gather it all up in one heap, to let it lie in that ſtate twelve hours, and then to turn it every fourth hour, during the ſpace of twenty-four hours.

No perſon ſhould be ſuffered to tread on the malt with their ſhoes, while it is on the floor; becauſe many grains are inevitably bruiſed thereby, and theſe, vegetating no longer, afford the roots of the other grains a ſubſtance into which they extend their fibres, and are by that means intangled in bunches; and beſides this, the bruiſed corn acquires a degree of putrefaction which taints the liquor made of the malt intermixed therewith. Equal care ſhould alſo be taken, that the grain be not bruiſed by any other means.

Mr. Combrune thinks, that the time moſt proper for malting is when the temperature of the air is ſuch that barley

barley begins naturally to germinate; at which ſeaſon the thermometer marks from between thirty-two to forty degrees. How far that time may be extended, experience alone can determine. The warmer the weather is, the greater muſt be the diſadvantage under which the maltſter labours; becauſe the motion of the fluids is then ſo ſtrong, that the proceſs goes on too quick, and the finer parts are apt to fly off; the conſequence of which is, that inſtead of a ſweet, the malt inclines to a bitter taſte, the oils being turned rancid. This is ſo univerſally experienced, that brewers carefully avoid purchaſing what is termed latter made malt.

The grain thus prepared for drying is ſpread on the kiln, where, meeting with a heat greater than is ſuited to vegetation, its farther growth is ſtopped. It is ſpread on the kiln three or four inches thick, and turned every three or four hours. The laying of it thicker it attended with inconveniencies, among which is particularly its being unequally dried; and therefore that ſhould be avoided. The ſtrength and duration of the fire is different, according as the malt is intended to be dried, pale, amber, or brown. The pale malt requires more leiſure, and leſs fire, than the amber or brown.

Pale and amber malt are dried with coke or culm, which not emitting any ſmoke, give the malt a brighter colour, and do not communicate that bad reliſh which malt has when dried with wood, ſtraw, &c. the ſmoke of which taints it. Coke is beſt, becauſe its fire gives a ſteady and conſtant heat, whereby the malt is dried uniformly. If wood, or any vegetable fuel is uſed, it ſhould be extremely well dried, in order, that, being as free as poſſible from moiſture, it may yield the leſs ſmoke.

The ſize of the malt kiln is generally proportioned to the quantity of malt for which it is intended. Some build their kiln ſquare, and others make it round; but this laſt is undoubtedly the beſt form, becauſe the heat of the fire is more equally diffuſed therein, and the grain is of courſe more equally dried. Various ſubſtances have been made uſe of for covering the kiln, ſuch as tiles, plates of tin, and wire: of theſe, the wire is to be preferred, becauſe it does not contract ſo great a degree of heat as to parch the grain in contact with it: but, for this very reaſon, hair cloth is preferable to any other covering; becauſe, when any part of the malt is in immediate contact with a ſubſtance much more ſolid than itſelf, and therefore capable of receiving a proportionably greater degree of heat, the malt in contact with that heated body is parched or burnt, by heat which is not equally diffuſed through the whole maſs, which maſs cannot therefore be all equally heated. The hair cloth is ſpread upon ſmall wooden rafters, and theſe are ſupported by bars of iron laid acroſs the kiln.

An ingenious and attentive maltſter marked the degree of heat in the malt whilſt on the floor: and the reſult of his obſervations in this reſpect is as follows. During the firſt ten days that the malt was on the floor, the heat in it was between 50 and 60 degrees. During the next three or four days, the heat was increaſed from 60 to 65 and 67 degrees; and during the laſt days of its lying there, to 80, 84, and 87, which laſt was the degree of heat when the malt was put on the kiln. There cannot be any abſolute rule as to the difference of heat during the different times in the proceſs of malting, becauſe it muſt be ſuited to the heat of the air: at leaſt we have not yet ſufficient data whereon to found ſuch a calculation. The heat of the malt on the kiln when fit for pale malt was 120 degrees, and when it was fit for brown the heat 147.

This intelligent artiſt's obſervation, that the malt was fit for what is called pale malt when its heat was at 120 degrees, ſuggeſts a caution which ſhould be more carefully attended to, namely, that whatever colour it be intended to give the malt, the heat at firſt ſhould always be the ſame: thus, for example, malt which is dried to the degree of high brown, ſhould firſt be rendered pale malt, then amber, and ſo on progreſſively; not by a ſudden increaſe of the fire, but by a longer continuance thereof. In this manner, the whole body of the grain is equally and gradually dried; whereas a ſtrong and quicker fire would parch, or as it were ſinge the outſide, while the internal parts remain moiſt: and as that moiſture is afterwards evaporated, it muſt crack the ſurrounding hardened cruſt, whereby the grain is again damaged in another reſpect.

As ſoon as the malt is dry, it muſt be removed from the kiln, and ſpread thin, that it may cool to the temperature of the air. It cannot be ſuppoſed, that any of its parts are capable of retaining the fire in ſuch manner as not to ſuffer it to eſcape; though ſome have conceited that they do. In proportion as malts are dried, their particles are more or leſs ſeparated, and coming in contact with water, they ſtrongly attract from it particles which fill up their interſtices. In maſhing, this action between the malt and the water generates a ſmall degree of heat, but no way durable; though from hence aroſe the opinion, that brown malt is full of fire.

Barley may, at a medium, be ſaid to loſe, by malting, one fourth part of its weight, including what is ſeparated from it by the roots ſcreened off: but this proportion varies, according as it is more or leſs dried.

The condition of the barley, as to its greenneſs or ripeneſs, at the time of its being gathered in, is clearly diſcernable when it is malted. If it was gathered green, it rather loſes than gains in quantity, the malt becomes of a ſmaller body, appears ſhrivelled, and often is unkindly hard; whilſt, on the contrary, that which was cut at full maturity increaſes in malting, appears plump, bright, and clear, if properly carried through the proceſs, and, on being cracked, readily yields that fine mealy ſubſtance ſo much deſired by the brewers.

Malt which has not had a ſufficient time to ſhoot, ſo that its plume, or acroſpire, as the adepts in malting call it, may have reached to the inward ſkin of the barley, remains charged with too large a quantity of its unattenuated oils. All thoſe parts which have not been put in motion by the act of germination, will, when laid on the kiln to dry, be ſo hardened, as not to be ſoluble in water, and conſequently will be loſt to the ſtrength of the drink.

When malt is ſuffered to grow too much, or until the ſpire has ſhot through the ſkin of the barley; though all that is left be malt, yet, as too large a portion of its oils will have been expended in vegetation, the malt will be greatly diminiſhed in proportion to what it ought to have been, and what remains cannot be fit to brew drink for long keeping, becauſe of the loſs of the oils.

Malt which has been duly worked on the floor, will, if it has not been ſufficiently dried on the kiln, be apt to germinate or ſprout afreſh; perhaps to conceive ſo great

a heat as to take fire; and ſhould it continue long with a moderate degree of heat, the leaſt evil that can be expected, is that it will grow mouldy and have an ill flavour.

Malt well worked, but over-dried, will be ſo hardened, or its ſaponaceous quality will be ſo deſtroyed, that it will not imbibe from the air that moiſture which is neceſſary to mellow it, and render it fit for brewing: for when it has been previouſly ſoftened by the moiſture of the air, it mixes more eaſily and more intimately with the water, and by that means yields a more copious extract, than it would otherwiſe do.

Malt juſt, or but lately, taken from the kiln, remains warm a conſiderable time. Until it becomes as cool as the ſurrounding air, it does not mellow by the addition of a due quantity of moiſture from the air: and the wort made of ſuch malt requires a much longer boiling before it breaks, than that which is made of malt ſome months old.

The practice of thoſe maltſters who ſprinkle water on malt newly taken from the kiln, to give it the appearance of having been made a proper time, or, to uſe their own expreſſion, to plump it, is highly blameable. It is, in fact, a downright fraud, practiſed chiefly becauſe leſs grain then fills the buſhel: but a farther evil is, that if it be not uſed ſpeedily, it heats, ſoon grows mouldy, and ſuffers great damage.

Malt dried on a kiln not ſufficiently heated muſt require a proportionably longer time for it to receive the due effect of the fire: for want of which it will be in the ſame ſtate as malt not thoroughly dried. Or if the fire be too quick, or too fierce, inſtead of gently evaporating the water from the corn, it ſcorches the outward ſkin, and ſeparates it from the body of the grain. The malt to which this happens is called brown malt; of which Mr. Combrune obſerves, that, by the internal expanſion of its parts, it occupies a larger ſpace than it ought to do. He adds, that if ſuch a fire be continued, it changes ſome parts of the grain into ſo brittle a ſubſtance, that the malt is ſaid to be glaſſy. The particles which are thus hardened will not diſſolve, or but in ſmall proportion: ſo that they frequently occaſion an almoſt total want of extract, which, in the phraſe of the art, is termed, ſetting the griſt.

The goodneſs of malt may be known by the following marks. Bite a grain of it aſunder, and if it taſtes mellow and ſweet, breaks ſoft, and is full of flour from one end to the other, it is good. If it has a round body, and upon putting ſome grains of it into water, they ſwim on the ſurface, it is good. Barley ſinks in water, and malt that is not well made will do the ſame: but it is to be obſerved that this is not an invariable proof, becauſe, if the malt be broken, or in the leaſt cracked, in will take in water, and ſink. Malt that is rightly made will not be hard, but of ſo mellow a nature, that if drawn over an oak board, acroſs the grain, it will leave a white line upon the board, like a mark of chalk. Its ſmell alſo may be conſulted; for malt, though otherwiſe good, may have contracted an ill ſcent from the fuel, or from the water uſed in the ſteeping.

Before malt is ground, it ſhould be freed from the tails and duſt, which would otherwiſe heighten the colour of the wort, render the liquor muddy, and give it a bad taſte, which could not afterwards be got rid of. The cylindrical ſieve will be of excellent uſe for this purpoſe.

The malt muſt be broken, in order to its communicating its virtue to the water. If it be ground too ſmall, its flour will mix too freely with the water, and cauſe the wort to run thick. Many are of opinion that the beſt way is only to crack it, ſo that none of the grains may come out whole: for the intent is, that the water ſhould draw out an extract, but not be mixed with the mealy part, in the manner of a paſte or gruel. Some think that malt is better ground by a ſtone mill, than by a ſteel one, becauſe the former bruiſes it, and the latter only cuts the grains.

After the malt is ground, it ſhould lie ſome time to mellow in a cool room where no ſun comes. The time for this is different, according to its kind. Brown malt may be ground at from three to fourteen days before it is uſed, in order that the corn, which is rendered uncommonly hard by that degree of drying, may be gradually ſoftened by the moiſture in the air; by which means it will become the more ſoluble in water. The pale malts require only one or two days. After lying thus in the air, leſs maſhing ſuffices; the ſtrength of the malt is more perfectly extracted, and the beer will be conſiderably ſtronger than it would be with the ſame quantity of malt taken directly from the kiln. Care muſt be taken that it get no damage in lying.

Mr. Combrune obſerves, that malt imbibes moiſture more readily by being ground and expoſed for ſome time to the air, than it does when whole; and that as the dampneſs thus abſorbed by the grain is in reality ſo much cold water, malt which has been long ground requires to be maſhed with hotter water than it would otherwiſe be neceſſary to uſe. *See the article* BREWING.

The reader is obliged for the following uſeful obſervations on the art of making malt to a very ingenious gentleman, who has practiſed the art many years.

Experience, and a conſtant obſervation on effects and their cauſes, have, ſays he, made me maſter of ſome pieces of knowledge relative to this ſubject, which your farming readers may probably think worthy their attention: the reſult of this experience I ſhall lay before them.

The firſt thing I ſhall mention, with regard to malt, is the benefit of changing the water whilſt it is ſteeping.

Some maltſters think this change of water no ways neceſſary; others, on the contrary, approve of it, but do it indiſcriminately in the ſame proportion during the whole ſeaſon. They are in both reſpects wrong; for the times when the water requires to be changed oftenеſt are at the beginning and latter end of the ſeaſon, in autumn and ſpring, when the weather is warm; for in the middle of the winter the weather is too cold to admit of the water being at all changed to any advantage. Suppoſe the barley to be left in ſteep forty-eight hours in the ſpring: if the weather is inclinable to be warm, the water may be in that ſpace of time changed three times; in other caſes twice may be enough; but the beſt rule to go by, is that which follows.

Every maltſter muſt know, that in the autumn and ſpring, if barley is left too long on the ſteep in the ſame water, the water will grow ſlimy, and ſometimes ſour: now I would adviſe the maltſter to watch the changes of the water, and when he finds that it is ſmooth and oily to the

the touch, and that it is inclinable either to ſmell or taſte ſour, let him by all means have it inſtantly changed; but he muſt obſerve, if he regards his intereſt, a particular method even in doing this.

The uſual way of changing the water is, firſt to draw off that in which the barley was ſteeping, and afterwards by pails full, or by pumping, fill the ciſtern again.

This I do not approve of, becauſe the barley when the water is drawn off lies cloſer, and is apt, in a very ſhort ſpace of time, to heat: this is a great damage to the commodity, and, without precaution, a conſiderable loſs enſues. Now my method has always been, firſt to get a hogſhead of water in readineſs near the ciſtern; which I cauſe to be thrown on the barley the inſtant the firſt water is drawn off; and as a hogſhead of water is ſufficient to wet eight buſhels of barley, I add afterwards as many hogſheads, ſave one, as my ciſtern will wet quarters. By theſe means I avoid the danger of the barley heating in the ciſtern.

The conſequences of not changing the water whilſt the barley is ſteeping, are often fatal to the malt.

I have already obſerved, that in the ſpring and autumn it is neceſſary to change the water often in which the barley is ſteeped: it ſhould likewiſe be remembered, that in theſe ſeaſons the making of malt, in all its parts, is a very critical buſineſs; particularly it is then neceſſary that the beds, or couches, ſhould be frequently turned, or the malt will not come kindly; but the tap root will be apt to ſhoot forth vigorouſly, ſtarving the other roots, and preventing them from accompanying it in its growth: this muſt be checked, and the remedy is, to turn the couch often, ſpread it thin, and give it a ſufficient quantity of air, at the ſame time keeping it cool and temperate. This will ſtop the progreſs of the firſt root, give the others time to ſprout, and the barley will malt kindly and regularly.

A thin ſkinned fine-coated barley is beſt for making malt, and is not the worſe for not being very full bodied; yet would I by no means recommend a lean, half-ſtarved unripe grain.

Barley, which has grown on lands highly manured, is not ſo good for making malt, as that which has been produced by land of a moderate richneſs without any manure: in fact, a luxuriant ſoil, whether naturally ſo, or enriched by art, is not, in general, beſt for yielding barley for the maltſters uſe.

For the reaſons above mentioned, never chuſe to buy barley from the farmers who have large crops, as it is moſtly a full bodied grain they have to ſell. I prefer, for malting, a grain which is the produce of a ſoil that is rather poor than rich, rater light than ſtrong, and more inclined to a gravel than a clay.

This grain is clean coated, taper, and elegant in its form, is full of flour, almoſt tranſparant when watered, and will be ſufficiently wetted in forty-eight hours.

This grain increaſes in the malting, fills the buſhel well, and makes a fine, ſweet, wholeſome, clean, full-bodied malt, from which the beſt of beer may be brewed, either brown or pale, according as the malt has been dried higher or lower.

Now I have mentioned drying of malt, a few cautions on that head may not be amiſs.

My practice has been to give my malt as much drying as I could on the floor: this is not only a great ſaving of fuel to me, but is alſo attended with ſeveral other advantages.

I find that my malt, by being thus gradually diveſted of its outward moiſture, does not ſhrink ſo much when it comes to be laid on the kiln; of courſe is meaſures to more advantage: it is beſides of a better quality, having acquired no foreign taſte in drying.

It may very eaſily be obſerved, that if malt is laid very damp on the kiln, a thick miſt, or ſmoky vapour, will immediately ariſe from the ſurface of it, which being repelled and condenſed by the cold circumambient air, falls again on the malt, where, by the heat from the furnace, it is a ſecond time rarefied, and aſcends in clouds of ſteam.

This alternate rarefaction and condenſation of the moiſture is of great diſſervice to the malt, giving it often a diſagreeable muſty flavour, and making it beſides more unfit for keeping.

Now, by my method of ſuffering the malt to receive a part of its drying on the floor, this inconvenience is, in a great meaſure, avoided; for the groſs moiſture is already evaporated before it is laid on the kiln, and that which remains creates no great degree of ſteam, provided the fire in the furnace is not at firſt made to burn too fierce.

With this precaution I have often made pale malt as fine as I have any where ſeen, ſuch as ſome gentlemen, who long dealt with me, frequently, nay, conſtantly, praiſed. In drying this malt, I took care that there was, during the whole time it was on the kiln, but a very moderate, yet equal, fire in the furnace.

If I had an inclination to have any malt high dried (for ſome like brown malt better than pale) when the moiſture was nearly evaporated, I cauſed the fire to be gradually encreaſed till it roared again in the furnace, taking care that the malt ſhould be properly ſtirred, leſt it proved kiln-burnt; and by this method I had a fine, ſweet, brown malt, fit for making harveſt beer, ſuch as ſome farmers are very fond of brewing.

Many are of opinion, that brown malt, uſed in the ſame proportion with the pale, will make the ſtrongeſt beer; but this is certainly a miſtake; or I have often made the experiment with great preciſion, but could never find any material difference, and what difference there was at any time, ſeemed to me to be rather in favour of the pale than the brown malt: this may eaſily be accounted for, as the flour in the pale malt always remained ſound and uninjured in the drying; whereas the brown malt would ſometimes, notwithſtanding all the care of the maltſter, be injured or parched by the fire, and that part which was parched had of conſequence loſt its ſpirit and virtue.

I muſt, however, on this occaſion, make one neceſſary remark, which is, that ſome pale malts are ſlack dried: theſe, I own, make a raw unwholſome liquor, which will not keep well; but if the pale malt is gradually and ſlowly dried by an uniform gentle heat, it will certainly anſwer the character I have already given of it, and will, beſides, (I have experience for my voucher) keep as well as any brown malt whatever.

Maltſters in general are too little nice in the barley they buy. I have already ſaid ſomething on this head, to which I ſhall add, that I would by no means have them ever bargain for mixed grain: what I mean by mixed grain, is barley grown on various ſoils, and in different fields. There is a ſure diſappointment in buying ſuch

grain, as the kerns will ſpire at different times, and ſome of them not at all; ſo that, after the couch is dried, ſome part of it will not be half malted, and a great deal of the remainder not malted at all.

In order to avoid this misfortune, for ſuch it is, as the maltſter's cuſtomers will, with too much reaſon, find fault with his commodity, let him by no means attempt to buy tythe barley, for that he is ſure is mixed: I experienced myſelf, many years ago, a great loſs by a purchaſe of the kind. A neighbouring farmer, with whom I was well acquainted, brought a ſample of barley to market: I looked at it, and though it was not very fine, I bought it, on account of his letting me have it ſix-pence a quarter cheaper than I could then buy of others: the lot conſiſted of one hundred quarters; but when it came home, and I had tried ſome of it, I think about ten quarters, I was greatly ſurpriſed to find the malt ſo bad, when examining the barley with great attention, I ſoon diſcovered the reaſon of it. Meeting the farmer, of whom I had bought it, within a day or two afterwards, I aſked him how he came to ſell me mixed barley, adding, that I always thought he kept his grain with more care ſeparate: he ſoon unravelled the myſtery, by telling me, that it was the parſon's barley, not his own, which he ſold me.

When I heard this, I was not a little diſpleaſed; however, reſolving to make the beſt of a bad bargain, I carried a ſample of it to market the next day, and ſold it to a hog-feeder for eighteen-pence a quarter leſs than I gave for it. This was ſome loſs; however I was glad to get off ſo well, as I would not have made the whole into malt, and have impoſed on my cuſtomers for an hundred pounds.

To ſhew that I am not ſelf-intereſted, I will inform your readers of a method by which they may diſcover whether malt has been made of mixed, or in part unripe barley. Take a bowl of water; throw into it a couple of handfuls of the malt; give it a gentle ſtirring, and the barley which has not been malted will ſink to the bottom; the half-malted grains will have one end ſunk, being in a vertical poſition; and the true good malt will ſwim. This experiment I have often made, and never found it deceive me.

The ſame barley, though ever ſo good, will not malt alike well at all times: for inſtance, take it as ſoon as it is houſed, it comes well, but whilſt it is in its ſweat, by no means; yet after it has done ſweating, it comes well again.

In the ſame manner, barley which has been got in early in a very dry ſeaſon, makes but indifferent malt; whereas the ſame barley, if it is left abroad till rain falls on it to looſen the huſk from the kernel, malts very well, and yields a large increaſe.

Alſo, old barley, mixed with that of the laſt harveſt, does not malt well, for the reaſons above mentioned; it does not all ſpear, or put forth its beard, at the ſame time.

Theſe I know are niceties which few maltſters attend to; yet I am certain that an obſervance of them, and ſome few more particulars, would increaſe their profits nearly ten per cent.

A great many maltſters in the counties of Hertford and Eſſex, make prodigious quantities of malt for the London market; and there are often diſputes happen between the maltſters and the factors and buyers at Mark-lane about the malt not holding out meaſure; the reaſon of which many of the country dealers are unacquainted with, and therefore know no other way of guarding againſt it, than by throwing in a buſhel or two extraordinary: this is ſome abridgement of their profits, and is beſides often unneceſſary. One reaſon for this deficiency is, the avariciouſneſs of the maker, who is willing to have as large an increaſe as poſſible, to the amount of ſix pecks in eight buſhels; whereas, if the malt is intended for the London market, four pecks is all that can, with propriety, be allowed; for it muſt not be drawn too long, and this malt requires more cleaning by the ſcreen, &c. than that ſold in the country.

Malt, if it is not thoroughly cleaned, will heat in the hold of the veſſel that carries it; and the tails, being looſened will fall off; the neceſſary conſequence of which muſt be a deficiency when it comes to be meaſured a ſecond time at the warf or ware-houſe: now, to prevent any altercation or diſpute, let the maltſter always cauſe his commodity to be well ſcreened before it is meaſured into the ſacks to be carried on ſhipboard: he need then put up no more than the meaſure; he will gain himſelf a character as a clean good workman; and I will anſwer for it, that the factors, if he makes his malt according to ſample, will readily give him one ſhilling a quarter more than his neighbours.

MALT-DUST, the duſt, &c. that ſeparates from the malt in the act of drying.

The following obſervations on the benefit of malt-duſt, as a manure for a ſtiff ſoil, with a relation of ſome experiments made to aſcertain its virtues, appeared in the *Muſeum Ruſticum vol.* III. *page* 277.

For the benefit of your farming readers, ſays this gentleman, I ſhall communicate a few experiments I made ſome time ſince, in order to try the virtue of malt-duſt as a manure for a crop of wheat.

I had often heard it aſſerted, that malt-duſt was much better ſuited, as a manure, to barley than wheat; for the latter lying a whole year in the ground, and the malt-duſt being ſown with it, the virtues of the manure were exhauſted long before the ſummer, when the corn principally wants nouriſhment; being advanced in its growth, and ſerved chiefly to make the wheat winter-proud.

Others, contradicting this aſſertion, ſaid it was beſt for wheat, and made it appear, that it often cauſed very good crops of corn, particularly after a hard winter.

Being determined in my own mind to try ſome experiments, in order to aſcertain this matter, I pitched upon a field of ten acres, which had borne a good crop of horſe-beans; after which it was ſown with turnips, which being fed off, it was ſummer-fallowed, being intended for wheat.

The ſoil was a ſtiffiſh loam; it was in good heart, and tolerably clean.

I divided this field by deep furrows into ten equal parts, each containing one acre, numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

The whole field during the courſe of the fallowing had four ploughings which reduced it to a fine tilth.

When wheat ſeed-time came, I ſowed number 1. broad caſt, with three buſhels of wheat, and ploughed it in laying on no manure whatever.

Num

Numb. 2. I ſowed with the ſame quantity of wheat, after which I ſtrewed over it ten quarters, or eighty buſhels of malt-duſt, and ploughed that and the ſeed in together.

Number 3. I ſowed alſo with wheat in the ſame manner, except that I deferred ſtrewing on the malt-duſt, till the latter end of January.

Number 4. had a dreſſing of dung in the ordinary way and was ſowed with three buſhels of wheat like the other parts.

Number 5. was dreſſed by ſheep-folding, and was alſo in like manner ſown with wheat.

Number 6. was ſown with wheat in the ſame quantity: and in February, after ſowing, received a half dreſſing of very rotten dung, which had been ſeveral times turned and mixed.

Number 7. after receiving a ploughing in the ſpring, was ſown with ten pecks of barley, which was harrowed in, and no manure at all applied.

Number 8. was ſown with barley, as above, but had ten quarters of malt-duſt laid on it.

Number 9. had in the winter a good dreſſing of dung, and was in the ſpring ſown with the ſame quantity of barley.

Number 10. was ſown with barley, like number 8. only it had five inſtead of ten quarters of malt-duſt laid on it.

It may be neceſſary, perhaps to obſerve, that all the pieces of wheat were ſown the firſt week in October, and all the barley the ſecond week in March.

Soon after Chriſtmas I went to take a view of my wheat, when I found that the acre marked number 2 looked moſt forward and flouriſhing; though I muſt own there was in appearance but little difference between that and number 4.

The numbers 1, 3, and 6, neither of them looked ſo vigorous as thoſe already noticed; and number 5. ſeemed rather thin on the land; but the wheat plants were in good condition and healthy.

In May I took another view of my wheat crops, and found number 1. tolerably clean, and promiſed well.

Number 2. gave me hopes of a large crop, and was ſurpriſingly clear of weeds.

Number 3. was greatly improved ſince the laying on of the dreſſing of malt-duſt.

Number 4. looked very vigorous and ſtrong, but was very foul, having ſeveral ſorts of weeds not to be met with in other parts of the land.

Number 5. was thin of plants, and they did not branch much; however they ſtill ſeemed healthy and ſtrong.

Number 6. was like number 3. greatly improved; but it was foul, and what appeared ſtrange to me, had many weeds of a nature quite different from thoſe with which number 4. was infeſted, though the dung laid on both theſe parts was taken from the ſame heap.

I at this time alſo looked at my pieces ſown with barley, when I found number 7. promiſing and clean.

Number 8. was forwarder, and flattered me with the proſpect of a large crop.

Number 9. was forward and fine, but foul with weeds.

Number 10. bore much the ſame appearance as number 8. and promiſed as well.

At harveſt number 2. of the wheat was firſt fit to reap, after which ſucceeded number 4. the reſt were ready nearly at the ſame time.

Of my barleys, number 8. and 10. were firſt ready to mow.

I ſuppoſe it is unneceſſary to obſerve that thoſe crops which were cleared of weeds were the ſooneſt fit for carrying.

I ordered theſe crops to be all laid ſeparately; and as I was obliged, juſt after Michaelmas, to go up to London, about ſome particular buſineſs, I left orders with my bailiff, that they ſhould all be ſeparately threſhed and dreſſed as early as might be in the winter.

The produce of the ſeveral crops was thus diſtinctly noted to me, for I had ordered that particular care ſhould be taken not to mix one with the other, and my orders were, I found, on enquiry, punctually carried into execution.

	Buſh.	Pecks
Number 1. unmanured, yielded of wheat	20	1
Number 2. manured with with malt-duſt when ſown —— —— ——	28	3
Number 3. manured with malt-duſt after Chriſtmas by way of top-dreſſing ——	41	0
Number 4. manured with dung in the ordinary way —— —— ——	32	2
Number 5. folded with ſheep ——	29	3
Number 6. dreſſed with rotten dung in February —— ——	30	0
Number 7. unmanured, yielded of barley	32	3
Number 8. manured with ten quarters of malt-duſt when ſown ——	48	0
Number 9. manured with dung in the winter	40	2
Number ten manured, when ſown, with five quarters of malt-duſt —— ——	44	0

I muſt, with your leave, treſpaſs upon your reader's patience, till I make a few obſervations on the above ſtate of the produce of my crop.

Firſt, I conclude, that when malt-duſt is uſed as a manure for wheat, it is beſt to lay it on by way of top-dreſſing after the corn is come up, as the crop of number 3. yielded above twelve buſhels more than that of number 2. and I am apt to think that the virtue of the malt-duſt laid on number 2. was exhauſted before it could be of any eſſential ſervice to the crop; whereas, in number 3. the manure began to yield forth its virtues juſt as the wheat plants began to be in want of a freſh ſupply of nouriſhment. It was alſo obſervable, that the grains of wheat which grew on number 2. were thinner, and had leſs ſubſtance, than thoſe of number 3. the grain of which was fine, plump, and heavy.

The produce of number 4. convinces me that malt-duſt is, in many caſes, a better manure for wheat than dung, not only as it gives a larger encreaſe, but alſo becauſe it does not ſtock the land with deſtructive and devouring weeds.

The wheat grown on number 5. was as fine as that of numbers 3. but conſiderably leſs in quantity, as appears by the account.

I do not much approve of the method purſued in number 6. yet is it a good alternative, if the farmer happens to have too little dung to dreſs all his fallows.

I judge alſo malt-duſt to be a very good and profitable manure for a barley crop; but the yield of number 10. being forty-four buſhels, and of number 8. only forty-eight buſhels, which laſt is not an encreaſe in proportion to the additional quantity of manure laid on, I thence

judge that eight quarters, or ſixty-four buſhels, of malt-duſt, is the proper quantity of malt-duſt to lay on an acre for a barley crop, and that at the time of ſowing.

When I ſpeak of malt-duſt, I mean the kiln-duſt, which falls from the malt in drying: as to the tail-duſt, which falls through the ſcreen whilſt the malt is cleaning before it is put up in ſacks, that may be applied to a better uſe, being generally given to pigs, and often to cows, in which laſt caſe it makes them give a great deal of milk.

It has been ſuggeſted that the virtue of malt-duſt, as a manure, laſts only for one crop; but this is a miſtake, for when this manure is laid on in January or February, a good crop of barley may be had after the wheat.

It (I mean malt-duſt) is of a very warm nature: this has induced many farmers to think that it will burn a crop; and I will not anſwer for it but it might do ſo on a hot gravelly ſoil; but on clay land, or a ſtiff-loam, it ſeldom or never does any damage: and indeed the only danger is a dry time enſuing after it is ſpread on the land, for the firſt ſhower of rain waſhes it in, and ſecures the crop from all hazard of being burnt.

Many of my acquaintance, beſides myſelf, have found that malt-duſt is for a ſtiff ſoil a better manure than dung; but the diſpute among them was, whether it was moſt profitable to lay it on when the wheat was ſown, or by way of top-dreſſing in January or February: however, ſince I made the above experiments, they are all converts to my opinion, and are determined in future always to dreſs their heavy wheat land with it after Chriſtmas.

One thing more in recommendation of this my favourite manure let me add before I conclude, that nothing ſurpaſſes it when laid on cold graſs grounds, to the amount of about eight quarters or ſixty buſhels on an acre, but not leſs.

Such as have not ſeen its effects in this way applied, would be ſurpriſed at the large encreaſe of ſweet feed which it occaſions: in ſhort, whoever finds it neceſſary to dreſs ſuch land, and can get malt-duſt in a ſufficient quantity, will do well to uſe it, as they will be puzzled to find any thing in the extenſive circle of manures better adapted to the purpoſe.

MANGER, the place or veſſel in which the horſe's corn is put.

MANURE, a general name for ſoil of all kinds laid upon land to improve it. *See* DUNG.

The following letter ſent to Dr. Templeman, *Secretary to the Society for promoting Arts*, &c. *to be by him communicated to the Committee of Agriculture, in Recommendation of a new Manure, is of too much Importance to be omitted here.*

"SIR,

"As a farmer, like a chymiſt, ſhould looſe none of his materials, but make even his waſhings, runnings, and reſiduums, turn out to his advantage, I have ſent you ſome account of an experiment I have made in manuring of land, which I beg you will lay before the committee of agriculture that they may communicate it to others.

"I am poſſeſſed, Sir, of a farm of near three hundred pounds a year, and have in my yard, what you uſually ſee in moſt farmers yards, two receſſes or pools, as reſervoirs of dung and water. Theſe reſervoirs in wet weather are continually running over; and of courſe part of the matter contained in them is caried off, by the neceſſary drains, into the highways, ditches, and rivers.

"As much of the eſſential quality of the dung is loſt in this manner, (for part of the ſalts, whether fixed or volatile, will be waſhed into the pools, and when they overrun will be conveyed into the ditches, &c.) I thought it a part of good huſbandry to carry this ſuperabundant water, or manure, (for ſo we may juſtly call it) on my land, which I did by means of a watering-cart, not unlike thoſe with which the roads near London are watered in the ſummer-time to allay the duſt.

"That the experiment might be the more obvious and certain, I firſt tried it (in the beginning of March, 1763) on a few acres in the middle of a large meadow, and on ſome lands in the middle of a large field of wheat, where, in a little time, I found a conſiderable increaſe, in growth, both of graſs and grain; and at hay time and harveſt, both the one and the other were much better crops than what the ſame lands produced that were not ſo manured.

"As a man, or even a boy, with one of theſe carts, and one horſe, may manure a great deal of land in a day, provided it be near the yard, I would recommend the practice to all my brother farmers; for the expence is nothing, but the value of the time of the boy and the horſe; and the encreaſe, by what I have ſeen will be very great.

"This manure may be alſo laid, to great advantage on land that is freſh ſown with barley, oats, or any other grain; but on graſs it ſhould be only laid in the winter time, when the rains will waſh the ſalts off the blade; or in the ſpring, when the lands are laid up for hay; as the cattle will not feed on the graſs, while the dung, or ſalt, adheres to the blade of it.

"This dung-water ſhould likewiſe be carried on the land, not at a time when it rains, but in the dry weather, and at a time when the dung-water in the pools is of a deep brown colour, and ſtrongly impregnated with ſalts. By this means the land may be manured from time to time, and the pools kept almoſt empty for the reception of freſh matter every time it rains; and nothing will be loſt.

MARE, the female of the horſe. *See the article* HORSE.

Such mares as are deſigned for breeding, ought to be as free from defects as poſſible, and ſhould, no more than the ſtallions, have either moon-eyes, watery-eyes, or blood-ſhot-eyes; they ſhould have no ſplint, ſpavin, or curb, nor any natural imperfection; for the colts will take after them: but choice ſhould be made of the beſt and ableſt, the moſt high ſpirited, beſt coloured, and fineſt ſhaped; and the natural defects that may be in the ſtallion, ſhould be amended in the mare, as well as that which is amiſs in the mare ſhould be amended in the ſtallion.

As for her age, ſhe may be covered when three years old; but the moſt convenient time is after four, when ſhe will nouriſh her colt beſt; and though ſhe may breed till ſhe is thirteen, yet ſhe is not fit for it when ſhe is paſt ten, for the colt of an old mare is commonly heavy. Before a mare is covered, ſhe ſhould be in the houſe about ſix weeks, during which time ſhe ſhould be well fed with good hay and oats well ſifted; and in order to render her conception the more certain, near a quart of blood may be taken from each ſide of her neck, about five or ſix days before covering. Another method to bring a mare in ſeaſon and make her retain, is to give her, for the ſpace of eight days before you bring her to the horſe, about two quarts of hemp-ſeed in the morning, and as much at night; and if ſhe refuſes to eat it, to mingle it with a little bran or oats o

or elſe to let her faſt for a while: and if the ſtallion alſo eat of it, it will greatly contribute to generation.

Mares go with foal eleven months and as many days as they are years old; and therefore the propereſt time for covering them is in the beginning of June, that ſhe may foal the May following, when there will be plenty of graſs, which will afford the mares a great abundance of milk for nouriſhing their foals: but a mare ſhould never be covered while ſhe is bringing up her foal, becauſe the foal to which ſhe is giving ſuck, will be prejudiced by it, and ſhe herſelf ſooner ſpent. After covering, let her, for three weeks or a month, have the ſame diet as before, and kept clean in the ſtable till the middle of May, with her feet well pared and thin ſhod: take her in again about the latter end of September, if not before, and keep her to the end of her foaling. If ſhe cannot readily bring forth, hold her noſtrils ſo as to ſtop her taking wind; and if that will not do, diſſolve madder, to the quantity of a walnut, in a pint of ale, and give it her warm. In caſe ſhe cannot void her ſecondine, or after-burden, boil two or three handfuls of fennel in running water, then put half a pint of that liquor into as much ſack, or, for want thereof into a pint of ale, with a fourth part of ſallad-oil, mixed together, and pour it luke-warm into her noſtrils, holding them cloſe for ſome time: otherwiſe give her green wheat, or rye, the laſt of which is beſt.

If the mare has but little milk, boil as much as you can get from her, with the leaves of lavender and ſpike, and bathe the udder with it warm, till the knobs and knots are diſſolved. She ſhould now drink only white water (which is bran put into water; give her alſo ſweet maſhes: and a month after foaling, let her have a maſh with ſome brimſtone or ſavine in it.

MARLE, a kind of dry, ſoft, foſſile earth, uſed in manuring land.

Marle is either grey, blue, brown, yellow, red, or mixed, and is known by its pure and uncompounded nature: beſides which, it is diſtinguiſhed by ſeveral other marks, ſuch as, its breaking into little ſquare bits: its faling eaſily to pieces, by the force of a blow, or upon being expoſed to the ſun or froſt; its feeling fat and unctuous; and its looking, when dry, after having been expoſed to the weather for ſome time, as if it was covered with a hoar-froſt, or ſpinkled with fine ſalt. Even when mixed with the land intended to be manured by it, the whole ſurface of the ſoil will have that whitiſh appearance. But the moſt unerring way to judge of marle, and know it from any other ſubſtance that may reſemble it, is, to break a piece as big as a large nutmeg, and, when it is quite dry, drop it into a glaſs of clear water, where, if it be the right ſort, it will ſoon diſſolve into a ſoft and almoſt impalpable pap, ſhooting up many ſparkles to the ſurface of the water. Some marles efferveſce but little with acids: but they ſhould always be put to that trial; becauſe the more they efferveſce with them, the more valuable they are as manures. In hot weather, good marle will flake with the heat of the ſun, like lime; eſpecially if any rain follows a hot day.

The farmers in Staffordſhire reckon the ſoft blue marle, which is moſt commonly found under clay, or low black ground, at the depth of ſeven or eight feet, the beſt for arable land, and the grey ſort the beſt for paſture. That which is of a browniſh colour, with blue veins in it, and little lumps of chalk or lime-ſtone, generally lying under ſtiff clays, and very hard to dig, is moſt eſteemed in Cheſhire. The marle which is uſually found at the depth of about two feet, or a yard, on the ſides of hills, and in wet boggy grounds which have a light ſand in them, is very fat and cloſe, and reckoned the ſtrongeſt of all marles; for which reaſon it is particularly good for ſandy lands. This is commonly called peat-marle, or delving marle. The paper-marle, as it is ſometimes called, frequently lies near coals, and flakes like leaves or pieces of brown paper, than which it is of a ſomewhat lighter colour. That which ſome writers call clay-marle, becauſe it looks like clay, is very fat, and ſometimes mixt with chalk-ſtones. Steel-marle breaks of itſelf into ſquare-cubical bits. Theſe two laſt kinds generally lie under ſand or clay; ſometimes about a yard deep under the former, but often much deeper under the latter.

Stone, ſlate, or flag-marle, which is a kind of ſoft ſtone or rather ſlate, of a bluiſh colour, is generally allowed to be the beſt. It eaſily diſſolves with froſt or rain, is found near rivers and on the ſides of hills, and is a very laſting manure. An ingenious gentleman, paſſing lately through Bedfordſhire, obſerved, that the people employed to mend the highways, were laying upon them a bluiſh kind of ſtone. Struck with the novelty of the appearance, he ſtopt, took up a lump, and ſoon found it to be this blue marle, which the ignorant peaſants were uſing inſtead of real ſtone. The conſequence was, that, when he returned the ſame way ſome time after, a heavy ſhower having fallen, the whole road where this ſubſtance had been ſo injudiciouſly ſpread, was become a perfect quagmire.

Mr. Markham reckons four ſorts of marle, in Suſſex; viz. grey, blue, yellow, and red. The blue is accounted the beſt, the yellow next, and then the grey. The red is the leaſt durable. A great deal of the marle in the north country runs much upon the loam; but that in Suſſex is more like fuller's earth, and therefore muſt certainly be the fatteſt.

Mr. Mortimer ſays, he ſaw a ſample of marle from Derbyſhire, which was very fat, though it contained ſo much ſand, that when wet, it could not be worked into a ball, or be made to hold together. This marle did very well upon clayey land, becauſe it was of an opening quality.

In many parts of moſt counties in England, marle diſcovers itſelf to the moſt negligent eye; particularly on the ſides of broken hills, or deep, hollow roads. Many rivers are bordered with a vaſt treaſure, which is plundered by every flood. Boggy lands frequently cover it; and, in them, it ſeldom lies above three feet deep. It is ſomewhat lower under ſtiff clays, and marſhy level grounds. The loweſt parts of moſt ſandy lands abound with it, ſometimes at the depth of three feet, and ſometimes at ſeven, nine, or more. The depth of the marle itſelf can ſeldom be found; for when the upper cruſt of the earth is removed, all that can be ſeen or dug is marle, to ſo great a depth, that there are few, if any, inſtances of a marle-pit's having been exhauſted.

Nothing is more common than to find the ditches which incloſe a field, dug ſo deep that they have penetrated ſix or ſeven inches into a bed of marle, without the farmer's taking any notice of it; though the extraordinary ſhooting and increaſe of the graſs which is put forth by the marle thrown up on the ſides of the bank, might, one would think, be a means of diſcovering it. Where the marle is thus accidentally diſcloſed, it not only turfs the ſides and

tops

tops of the banks, and thereby ſecures them againſt all injuries of the weather, but makes the graſs grow ſo long and thick, that, when beaten down by winds, it hangs as if it thatched the earth which nouriſhed it, and carries off the rain, without letting any great quantity penetrate through it.

The marquis of Turbilly, in his excellent directions for clearing and breaking up land, recommends, for boring it (in order to know what different layers of earth, ores, quarries, ſprings, &c. lie underneath, and at what depth, by which means the better judgment may be formed of the plants moſt proper for the ſoil), an inſtrument of his own inventing, as far ſuperior to any thing that has yet been thought of for that purpoſe. A deſcription of it may be of ſervice to every ingenious improver of land. *See the article* BORER.

Marle is very common in Ireland, where it ſeldom lies above a foot or two below the ſurface of the ſoil; luckily for that country, which is extremely boggy. But in France, though they have marle in many places, they are often obliged to dig for it very deep, particularly in the province of Artois, where it generally lies eighty or ninety feet under ground, in beds about five feet thick, at the bottom of which frequently is water, which breaks in upon the workmen. On account of this great depth of the marle-pits there, extraordinary care is taken to ſet up marks, and rail them in, to prevent the fatal accidents which might otherwiſe happen. The ſame is, indeed, done in England; but not ſo ſtrictly as it ought to be.

Authors differ widely both as to the quantity and the manner of uſing almoſt all the manures they treat of; points which muſt, in a very great meaſure, depend on the quality of the ſoil, and the ſtrength of the manure, of whatever kind it be, and in which experience will ever be the judicious farmer's ſureſt guide. In marling, it is particularly neceſſary to find the true proportion which the land requires, and better to err in laying on too little, than too much; becauſe more may be added at pleaſure; whereas by over-doing it, the firſt year's crop often fails, becauſe the body of the marle has not been ſufficiently opened; and, in that caſe, it will ſometimes be two or three years before the ground comes to a proper temper. The beſt directions that can be given to the farmer in the application of this manure to light ſoils, is, to lay on the quantity which will give the degree of coheſion wanted in thoſe ſoils. A general rule cannot be laid down in this reſpect; becauſe, the quantity of marle requiſite to effect the deſired end, muſt be different, in proportion to the degree of lightneſs of the ſoil.

Pliny ſpeaks of marle as a ſpecies of improvement known to the Greeks, but more peculiar to Britain and Gaul. He calls it, the fat of the earth, and compares it to the glands in the human body, which are lapped in a coat of fat. As this manure, ſo far as we can find, was not uſed, and probably not to be found, in Italy, it ſhews how attentive the Romans were to agriculture, wherever they carried their victorious arms; ſince, notwithſtanding the continual alarms they lived in from the natives here and in Gaul, they found time to diſcover and perfect a means of improving land, particularly ſuited to the ſoil and climate, and, of all others, the cheapeſt and moſt laſting.

Before we quit this ſubject, we muſt obſerve, with Dr. Home, that a body very ſimilar to marle in its appearance, but eſſentially different in its effects, is often found in the ſame bed with the beſt marle. It is of a darkiſh lead colour. Inſtead of fertilizing the earth, it renders even the beſt ſoils incapable of bearing any kind of vegetables for many years after. I have ſeen, ſays that gentleman, the ſpots on which it was laid, entirely barren three years after; and have heard of its bad effects continuing in other places for a much longer time; nor is it certain when they will ceaſe. A body ſo very deductive to agriculture, deſerves to be well characterized, in order to its being ſhunned; and ſhould be thoroughly examined, that we may know whence proceeds this noxious quality, and how to cure it when it has taken place.

Marle takes a ſmooth poliſh from the inſtrument with which it is wrought. A piece of this taken up, when it has not been much expoſed to the influence of the air, differs greatly in taſte from marle. Inſtead of the ſmooth unctuous taſte of the latter, it is acid, and remarkably aſtringent. It agrees with marle, in crumbling in water but differs remarkably from it in not raiſing any effervescence with acids, nor in the leaſt deſtroying their acidity. It turns the ſyrup of violets red; which ſhews that it contains an acid: whereas marle, like all abſorbent earth, gives it a green colour. The trying of marle with acids is therefore the more neceſſary, to guard againſt uſing this pernicious ſubſtance.

It appears from experiments made by the doctor, that this pernicious ſubſtance conſiſts of an earthy body like clay, about an eighteenth part of ſalt of ſteel, and a ſmall proportion of the vitriolic acid: from whence he concludes, that good marle is the proper cure where this noxious earth has been inadvertently uſed; becauſe it corrects the acid, and decompoſes the ſalt.

The following account of marle was ſent by a very intelligent gentleman to the editors of the *Muſeum Ruſticum*.

A ſhort Diſſertation on Marle.

It is taken out of the bowels of the earth at ſeveral depths, is of divers colours as after named, and ſome ſorts have often two or three colours intermixed. It is unctuous, of a ſlippery nature, and in goodneſs pure; ſoon relents after rain, and, when dry, ſlackens like lime, and at laſt diſſolves into the fineſt powder.

I intend to leave with you ſome ſpecimens of two kinds of marle (which you may give to the gentlemen or farmers who deſire them): they are what I have collected in Middleſex, which county abounds with good marle; but it is not uſed by the gentry, or farmers, ſo much as it ought, becauſe they have ſo readily dung, ſoot, aſhes, and other compoſts, from London.

In order to diſcover marle, the beſt way is to uſe the augur, and obſerve the ſtrata taken up from time to time by it.

I have found, after I have got through the ſurface, which is about a ſpade and a half deep, that the next earth was a very ſtrong, coarſe, bed of clay, five or ſix feet deep; afterwards, getting through it, the auger brought up marle, viz. that which appears of a fine light-brown colour, and ſome of it mixed with blue veins (which I will here call pigeon marle, by way of diſtinction): here was a bed of this pigeon marle of five or ſix feet deep, and after that followed another kind of marle, which I will call toad marle, by way of diſtinction; this is heavier and without any veins of blue.

Whe

When either of theſe marles are dug out of the pit, the ſpade cuts them like ſo much ſoap; and the laſt-named marle looks very blackiſh and dark, and may be, and I believe is, in ſome countries, called toad marle, from its reſemblance in colour to that animal; but this marle being expoſed to the air alters the colour very much. This appears to me to be the ſtrongeſt marle.

Marles may be diſcovered ſometimes near the ſurface, by carefully obſerving the ditches and fences of your lands.

It is frequently found near rivers, or brooks, and ſometimes may be diſcovered on the banks of ſuch waters.

To know when you have found true Marle, try it by Air. Fire, and Water, or Vinegar.

Firſt, By expoſing a large lump of three or four pounds in the air, which, if true marle, will, in a little time, by the nitre, dews, &c. break into ſmall parts; and there will be an hoary, or white, congelation on that part of it which is expoſed to the ſun.

Secondly, When your marle is dry, break it into ſmall particles, and put an handful into a hot coal fire, and it will crackle as if ſo much ſalt had been put therein.

Thirdly, Place a piece of the dried marle in a glaſs, and thereon gently pour as much water as will cover it. If true marle, it will then gradually moulder, and diſſolve into a liquid ſoap. Let not the glaſs be ſhaken, that you may obſerve the ebullition (which is material); or you may, in like manner, try it with vinegar, where the effervеſcence, or ſtruggling, will be much ſtronger than in water.

The Virtues of Marle.

It is the beſt manure for ſandy, dry, gravelly, or light lands of any kind. It is excellent for moſſy lands. It is, indeed, good for all other lands, of what nature ſoever, even clay, provided care be taken in laying on a proper quantity, and that the ſame be well diſſolved.

Care muſt be taken in the quantity uſed; if too little, you may eaſily add; but if too much is laid on the land, you cannot take it away.

It is uſed in ſome countries for arable lands only: yet it is as good for graſs or paſture lands, but does not the firſt, and ſeldom till the ſecond year, ſhew forth its utility; and then you will obſerve the graſs to ſhoot out a dark, or blackiſh colour, which afterwards turns to the fineſt green; and with it come up quantities of white clover-graſs, which hath occaſioned me ſome difficulty with the farmers to convince them I had not ſown the clover ſeed.

If lands are properly marled, they will continue good for twelve or fourteen years for the plough; and for paſture, or graſs-lands, much longer.

I would recommend that the plough be not ſuffered to enter into the land till the marle is thoroughly diſſolved.

Fiſh thrive prodigiouſly, and grow fatter in marle-pits than any other ponds.

Quantities to be uſed.

A great difficulty this to aſcertain the quantity.

In ſome countries they will tell you of laying three hundred loads to an acre, others more, others leſs; but they no where aſcertain what is a load. In Cheſhire and Lancaſhire the loads are ſcarcely ſix buſhels, and they uſe a ſmall cart made for the purpoſe, drawn by two or three ſmall horſes.

If the land is gravelly, ſandy, or light, let as much be laid on it as will make good a thick coat to bind and ſtiffen the ſoil.

But let the land be what it will, ſo much ſhould, in all events, be laid on as will make a thin coat over the entire ſurface.

Upon my lands, which are graſs and paſture, of a tolerable mould, on a clayey ſoil, and which were left, about eight years ſince, in a bad plight, by the late tenant, I firſt attempted to lay ten loads to every acre, (by a load I mean as much as three large, well fed, ſtrong horſes could draw) but found it was too little, and would not meet in the ſpreading.

I immediately doubled the quantity, and two years afterwards I added another coat of fifteen loads more to every acre, and find it anſwers very well for hay and paſture. I need not ſay horſes and cows are fonder of this hay and graſs than of that wherein the dung may be taſted and ſmelt.

A work of this kind ſhould be ſet about by the end of Auguſt, or beginning of September; and the loads ſhould be ſhot into ſmall heaps, as the Middleſex farmers ſhoot their dung, viz. two or three buſhels in each heap; and a man muſt be ready to ſeparate it, that the nitre, air, dews, and rain, coming on the large pieces, may act, and cauſe them to break, as of themſelves, into ſmaller parts.

After the marle has been laid upon the ground, and you ſee that the air, nitre, &c. have looſened the great lumps, and they are ready, on a ſlight touch, to fall into pieces, a perſon ſhould be ordered (when the weather and marle are quite dry) to break and ſpread the pieces to complete your coat; and you ſhould avoid as much as poſſible, leaving any large pieces to lie and diſſolve without being ſpread on the ſurface, but cauſe them to unite therewith.

In the beginning of February, and in dry weather, I cauſe an old gate to be well buſhed, and a heavy weight laid on it, to be drawn by one horſe over the whole field, in order that every part may have its due proportion.

If you intend to plough your lands, the preceding cautions are not ſo neceſſary, as the plough and harrows will ſpread and intermix the marle with the ſoil ſufficiently; but if you uſe the drill-plough, the above hints may be uſeful.

It would take a volume to give an exact and full hiſtory of marle, its virtues and uſes, and to ſhew that it was uſed by the Romans, and many years diſcontinued, and eſpecially till the houſes of York and Lancaſter were united, and then revived in ſome few counties; and the great benefits received by marling in Suffolk and Norfolk within a few years paſt.

We very well know that gentlemen and farmers are a long while ere they care to venture on the practice of marling from theory, and principally from not having ſeen or known what is, and what is not, true and genuine marle, and from being unacquainted with the rules or modes to judge and determine upon it: therefore, if this ſhort account will obviate their doubts, and in any way contribute

contribute to the advancement of agriculture, vegetation, and paſturage, my deſign is anſwered.

There are variety of colours in marle, viz. blue, white, yellow, red, and other colours, which make no material difference, provided they be earthy and fat, or ſlippery as ſoap, and as free as poſſible from a mixture of ſand, gravel, or ſtone.

DICE MARLE, a name given by the people of Staffordſhire to a reddiſh marle, that breaks into ſmall ſquare pieces like dice, or into thin flakes, in the manner of lead ore, and looks ſmooth on the ſurface.

Marle is diſtinguiſhed by ſeveral names, but principally by the four following.

1. Clay marle, ſo called becauſe it reſembles clay, though a very different body.

2. Stone marle, which approaches to the hardneſs of ſtone, and is therefore eaſily diſtinguiſhed from clay marle, which is ſoft, and is of ſlower operation.

3. Slate marle; this lies in thin layers reſembling ſlate, and is alſo harder than the clay marle.

4. Shell marle; which is a compoſition of earth and ſmall ſhells. It is of a lighter ſubſtance than the others; lies near the ſurface of the earth, in low grounds, that have formerly been overflowed with water; and ſometimes near the ſea. This is a very rich manure, and of quicker effect than either of the former.

Marles are all compounded of the ſame kind of materials, in different proportions, viz. a calcareous earth, clay, and ſand; and in ſome marles are found ſome ſhining flakes of foliacious talc, unſoluable in acids, and very little altered by fire.

There are ſeveral kinds of earths that reſemble marle, ſome of little uſe as a manure, and others that are pernicious to land, as before obſerved. The colour and appearance, are no certain indications of the quality of marle, which the farmer ſhould know, before he ventures to lay upon his land any earths as marle, the quality of which he has no experience of. Farmers having no certain rule of judging this, have been fearful of uſing marle; which has deprived them of the benefit of this excellent manure, which is to be found in many places, and might be of much more general benefit, did the farmers know how to diſtinguiſh it. The ingenious Dr. Ainſlie, has lately made very curious experiments upon the ſeveral ſorts of marle, which are the more valuable, as farmers may themſelves perform them; which they are adviſed to do, and to ſearch for marle, by digging and boring; and when they find any earths reſembling marle, they may diſcover with certainty, whether they or any of them is genuine marle, by the following eaſy proceſs.

1. Put a little freſh dug clay marle into a glaſs, and pour upon it as much water as will cover it; the marle will ſoon diſſolve in the water, into a ſoft ſoapy ſubſtance. Or if expoſed ſome time to the air, it will fall down into a fine powder.

2. Marle effervesces with all acids; a little of it put into a glaſs with vinegar, a briſk motion will immediately be excited; it will effervesce, ſparkle and riſe like wine or cyder, and air bubbles will continue to riſe, till the acidity of the vinegar is deſtroyed. Some other kinds of earth will fall down in water or air; but whatever body has this property, and alſo effervesces with acids, the farmer may conclude to be marle.

It will be of uſe to farmers, not only to diſtinguiſh marle from other bodies, but likewiſe to diſcover, before they make uſe of it, what proportion any marle contains of calcareous earth, clay, and ſand. This he may readily do, in the following manner.

Having dried and powdered the marle to be examined, pour upon any weight of it a ſmall quantity of water. To this mixture, well ſhaken, add a little of the acid of ſea ſalt, and when the conſequent effervesence is over, add a little more of the acid. Repeat this addition at proper intervals, till no more effervesence enſues. Then throw the whole, with an equal or greater proportion of water, into a filter of brown paper, whereof the weight is known. When all the fluid parts have paſſed through, fill up the filter, again and again, with warm water. By this means the diſſolved particles of calcareous earth, adhering to the reſidue, or entangled in the pores of the paper, will be waſhed away, and nothing but what is really unſoluble, will remain in the filter. This reſiduum, with the filter, is then to be compleatly dried, and weighed: the difference betwixt its weight, and the original weight of the filter, gives you the weight of the unſoluble parts (the clay and ſand) contained in the marle under examination. This being known, the proportion of calcareous earth therein is evident.

Here it is to be noted, that a vegetable acid, as vinegar, is not proper for this experiment; becauſe all the calcareous earth in marle, cannot uſually be extracted by it: for after the uſual filtration, the reſiduum effervesces with acids. Neither is the vitriolic acid proper for this uſe: for though it effervesces with all marles, it does not diſſolve their calcareous earths, but only forms with them a whitiſh coagulum, which will not paſs through the filter. But all the other mineral acids, may be employed to equal advantage; as the acid of ſea-ſalt, nitre, &c.

The proportions of clay and ſand, contained in the reſiduum, or unſoluble parts of this proceſs, are diſcovered by what is called elutriation, which is thus performed. Having weighed this dry reſiduum, mix and ſhake it well, with a ſufficient quantity of water: and after allowing a little time, for the groſſer parts to ſubſide, let the water, with the fineſt part of the clay ſuſpended in it, be gently poured off, then add more water to the remainder, and after ſufficient mixture and ſubſidence, pour off that likewiſe. In the ſame manner repeat this operation, again and again, till the water comes off perfectly pure; the ſubſtance that then remains is ſand, mixed, perhaps, with ſome flakes of talc; and whatever this ſubſtance wants of the weight of the reſiduum employed, is the weight of pure clay, carried away by the water, in this proceſs of elutriation.

This experiment, for diſcovering what proportion is contained in marle, of calcareous earth, clay, and ſand, is not propoſed as a matter of mere curioſity, but that the farmer, who will take the ſmall trouble of examining marle in this manner, may thereby know for which of his lands the different ſorts of marle is moſt proper: for though marles will fertilize all ſorts of land, yet not equally. Thoſe marles wherein he finds the largeſt proportion of clay are moſt proper to lay upon his ſandy light land; and thoſe that contain the moſt ſand, for his ſtrong land: the calcareous earth fertilizes both ſorts of land, the light and ſtrong.

It has been a common opinion, that all rich manures were ſo, becauſe they contained much vegetable food. Hence marle was thought to contain a large proportion of nitre, or other ſalts; but when it was found, that it contained no ſalts, it was then ſuppoſed, that it attracted them from the air; but this is now diſcovered to be alſo an error: for from many accurate experiments upon all the marles, that have been long expoſed to the air, no ſalts, of any kind, have been found in any of them, except in one experiment made by Dr. Ainſley, who found ſome muriatic ſalt in one bed of marle, that had been expoſed for ages to the open air; but none in any other bed of marle, that had the ſame expoſure.

It is ſingular that no veſtiges of this or any ſalt appeared upon any of the beds of marle but one, and this one had nothing peculiar, either in its compoſition or ſituation. It differed from the reſt in this only, it was poſſeſſed of a greater degree of moiſture; but whatever was the cauſe of this ſingular inſtance, it can be no foundation for the opinion of marle attracting ſalts from the air. And marles are found to produce the moſt remarkable effects on light exhauſted ſoils, where they can find little or nothing proper for furthering a nitrous proceſs, or the production of any other ſalt hitherto known.

Stone and ſlate marles, being harder than clay marle, are longer in diſſolving; and therefore a larger quantity of them may be laid upon land than of clay marle, whereof about thirty cart-loads has been recommended as a proper quantity to be laid upon an acre; of the harder ſorts of marle ſomewhat more, but of ſhell-marle ten or twelve loads; this being of a more open texture, and ſudden effect, much of it laid on at once, would make the crops too luxuriant. And in general it is moſt adviſeable in laying on marle, to lay it rather ſparingly at firſt, till the effects of it are ſeen, as it is eaſy to add more afterwards.

MARSHY LANDS, a ſort of paſture or grazing grounds, lying near the ſea, rivers, or fens.

As to lands lying near rivers, the great improvement of them is their being overflowed, which brings the ſoil of the uplands upon them, ſo that they need no other mending, though kept conſtantly mowed. The great inconveniency of theſe lands is their being ſubject to floods, which high hills near the ſides of rivers, and the long courſe of them, beſpeak to be frequent: and, though the richeſt land generally lies near ſuch rivers, yet there is the greateſt danger of the crops being ſpoiled, eſpecially when they are not incloſed, and therefore cannot be fed with cattle. This, when feeding bears any thing of a price, would be the very beſt way of managing theſe uncertain lands; and incloſing them would be highly beneficial on this acount. *Mortimer's Huſbandry.*

The marſh-lands in Lincolnſhire, and many other parts of England, produce a ſort of graſs, which feed ſheep in a better manner than that of almoſt any other land, in regard to their ſize, and the quantity of wool. The ſheep about Grimſby, and ſome other places in this county, produce ſuch luſty wool, or, as they call it, wool of ſo large a ſtaple, that three or four fleeces uſually make a tod of twenty eight pounds weight. Several hundred loads of this wool are yearly carried from theſe places to Norfolk, Suffolk, and other parts of the kingdom, for the cloth manufacturers. They ſend this in large packs, which they call pockets, each containing about five and twenty hundred weight. *Philoſ. Tranſ.* Numb. 223.

When marſh lands lie flat, it is neceſſary for the owner to keep all the water he can from them. The ſea-water in particular is to be kept from them as much as poſſible; and this is uſually done at a very great expence, by high banks and walls.

Two things greatly wanting in theſe lands, in general, are good ſhelter for the cattle, and freſh water. The careful farmer may, however, in a great meaſure obviate theſe by digging in proper places, large ponds to receive the rain water, and by planting trees and hedges in certain places towards the ſea, where they may not only afford ſhelter for the cattle, but keep off the ſea breezes, which often will cut off the tops of all the graſs in theſe places, and make it look as if mowed.

Theſe lands fatten cattle the ſooneſt of any, and they preſerve ſheep from the rot. It would be of great advantage to them, if there were raiſed, in the middle of every large marſh, banks of earth in a croſs, or in the form of two ſemi-circles, and theſe planted with trees; theſe would ſerve as a ſhelter for cattle, let the wind blow from what quarter it would, and would ſoon repay the expence of making.

There are, in different parts of England, very large quantities of land upon the ſea-coaſts that would be worth taking in, though no one has yet thought of doing it. The coaſts about Boſton, Spalding, and many other parts of Lincolnſhire, give frequent inſtances of this, where the ſea falls from the land, ſo that on the outſide of the ſea walls, on the owſe, where every tide the ſalt water comes, there grows a great deal of good graſs, and the owſe is firm to ride upon when the water is upon it.

This owſe, when taken in, hardly ſinks any thing at all, and they dig the walls from the outſide of it, all the earth they are made of being taken from thence, and the ſea, in a few tides, filling it up again: and though the ſea, at high water, comes only to the foot of the bank, yet once in a year or two, ſome extraordinary tides go over the banks, though they are ten feet high. Theſe banks are fifty feet broad at the bottom, and three feet at the top; and the common price of making them is three ſhillings a pole, the earth being all carried in wheelbarrows, and face towards the ſea, where the greateſt ſlope is, being turfed. *Mortimer's Huſbandry.*

MATFELLON. *See* BLUE BOTTLE.

MAY-WEED, a wild ſpecies of chamomile, a trailing perennial plant, which puts out roots from its branches as they lie on the ground. By this means, and by ſcatterings its ſeeds long before the corn is ripe, it ſpreads and multiplies greatly. In flowers in May, and thence has acquired the name of May-weed.

The means of extirpating it are, ſummer fallows, repeated good harrowing, and burning the collected roots, as before directed, in ſimilar caſes, or, which will be found ſtill more effectual, the frequent hoeings practiſed in the New Huſbandry. What eſcapes theſe clearings ſhould be very carefully pulled up by hand; for the common weeding-hook will not go deep enough to take out the whole of the long ſlender tap root of this plant, of which every remaining bit that has a knot in it will produce new ſhoots. Nor ought the farmer to regret this ſmall additional expence, to get rid of one of the moſt fatal enemies his corn can have. Mr. Liſle aſſures us, that as good a crop of wheat as one would wiſh to

ſee all the winter time was, to his knowledge, ſo deſtroyed by the coming up of May-weeds and poppies in the ſpring and ſummer, that it did not at laſt yield ſo much as the ſeed.

MEAD, a liquor made of honey, and held in great eſtimation by moſt of the northern nations, but perhaps not eſteemed here ſo much as it might deſerve, if due care was taken to prepare it properly.

All the writers who have hitherto treated of this ſubject, have given into a capital error with regard to the ſtrength of this liquor, by directing too great a proportion of honey to be diſſolved in the water. The uſual practice of making it ſo ſtrong as to bear an egg, is very wrong. The liquor is thereby rendered a meer ſtum, and this bad quality is ſtill increaſed by the long boiling generally practiſed. It is ſcarcely poſſible to procure honey ſo pure, but that ſome bee-bread, wax, or other ſubſtance, is mixed with it; and this cannot be perfectly ſeparated from it, ſo far as I know, but by boiling. On this account the boiling of mead ſeems indiſputably neceſſary. In order the more effectually to ſeparate theſe impurities from the liquor, it will be adviſable to mix ſome whites of eggs with it before it is put on the fire, and it will be particularly neceſſary to ſkim off the thick ſcum that riſes, the moment the liquor begins to boil; and this muſt be attentively continued ſo long as it boils. The only intention of boiling being here to ſeparate the impurities, and to make a perfect union of the water and the honey, both which purpoſes are very ſoon obtained, it evidently appears, that the boiling need be of but very ſhort duration. This becomes here more particularly neceſſary, becauſe the liquor will be the leſs diſpoſed to ferment kindly, the longer the boiling has been continued. It is perhaps owing to the ſingle article of long boiling, that mead has hitherto lain under ſo great diſcredit; becauſe it then never fermented ſufficiently to take off its luſcious ſweetneſs; whereas, had it undergone a due fermentation, that ſweetneſs would have gone off, and the mead would have attained a fine racy flavour.

Some notable houſewives have added hops to their mead. This helps to take off its ſweetneſs, and, as the bitterneſs of the hop goes off, gives it a pleaſant flavour. A ferment is here, as in all liquors that are boiled, generally wanted to bring on a perfect fermentation: but as the leaſt taint in the ferment is communicated to the whole liquor, particular care ſhould be taken that it be very ſweet and good. Mead, judiciouſly managed on theſe principles, will keep for years, and be improved by age. The racking, fining, &c. of this liquor, are the ſame as thoſe of other white wines.

MEADOW, a general name for paſture or graſslands, annually mown for hay; but is more particularly applied to lands which are ſo low as to be too moiſt for cattle to graze upon them in winter, without breaking the ſward.

Meadows, being generally enriched with the fine mould waſhed down from the adjacent riſing grounds, are uſually of a good ſoil, and ſeldom require any other improvement, than the removing of temporary imperfections. But they may likewiſe be of ſuch a nature as to ſtand in need of a more particular treatment: as is the caſe when their ſurface is a moſſy looſe earth, or when it is of a binding or clayey quality.

If, through long neglect, a coarſe ſtrong graſs, ruſhes, or other buſhy plants, be ſuffered to remain upon the ground till they rot there, they will, in ſome years, form a looſe ſpongy ſubſtance, ſomewhat reſembling moſs. In this caſe, the firſt neceſſary ſtep is to pare off and burn that looſe ſurface, or at leaſt ſo much of it as to enable the plough afterwards to reach the better ſoil underneath. The manner of doing this has already been explained ſo very amply, that it will be ſufficient to add here, that this looſe upper earth muſt be ſo ſtrengthened as to afford ſufficient ſtability to the roots of whatever plants are ſown on it, by mixing it well, either with the better ſoil underneath, or with marle, clay, or rich loam, brought to it from the neighbouring grounds, or with the compoſts before directed for this purpoſe.

If the ſoil is clay, or a ſtrong binding earth, the treatment of it is much the ſame, whether it be meadow or upland paſture. Such ſoils, by retaining water in every hollow place, become what the farmers call ſour, and produce a coarſe graſs, compoſed, as Mr. Miller obſerves, of bad weeds, of which the ſeveral ſorts of docks make no ſmall ſhare. Although many of the meadows produce a great burden of what the country people call hay, yet this is fit only for ſuch cattle as, by hard labour and hunger, are driven to eat it: for horſes which have been accuſtomed to feed on good hay, will almoſt ſtarve rather than touch this. A plain proof of its being diſagreeable to all cattle, is, that when they are turned in, after it has been mowed, we often ſee the ground covered with rank weeds, which they will not meddle with.

When a paſture is in the ſtate above deſcribed, if there is a ſufficient depth of ſoil to admit of it, the ſurface ſhould be pared off, and burnt: and as ſuch places are uſually over-run with ant-hills, theſe ſhould alſo be burnt; after which, by the addition of proper manure, and by the help of deep plowing, the land ſhould be brought into fine tilth. The deeper this improvement goes, the deeper and more laſting will the graſs be. We have been informed of a particular inſtance of the good effects of this method, by which the gentlemen who practiſed it had graſs which continued for years in a ſtrong ſtate of vegetation, and was conſtantly near a month forwarder than that of his neighbours, whoſe ſoil and ſituation were exactly the ſame.

Let not any one be deterred by the expence attending this improvement: for the crops of grain and other plants taken while the ſoil is thus preparing, will nearly repay all the charges, and the ground will afterwards yield much more plentiful crops of graſs; at leaſt for a number of years. But as clayey lands require more frequent and more thorough repairs than other ſoils, the returns of tillage propoſed by Camillo Tarello will be the moſt proper means of managing them.

He would have farmers divide their paſtures in four parts, keep one of theſe parts under grain or pulſe, during five years, and at the expiration of that time lay it down to graſs as before; and ſo proceed with every other part. He propoſes, that the firſt breaking up ſhould be by paring and burning, and thorough plowing. But if we may differ from him in opinion, we think it is needleſs to keep the ground ſo many years in tillage, unleſs this ſhould ſuit the huſbandman's convenience for the culture of particular plants. In this caſe the paſture may be divided into five or ſix parts. After each part has thus been in tillage Tarello adviſes breaking up again the ſpot firſt began with though not by burning now, but only by ploughing, i order to ſow it as before. "This, ſays he, will be profi ab

able to the husbandman, and improve the pasture. It will benefit the husbandman, because he will thereby raise a greater quantity of corn; and it will do good to the pastures, because nothing is more serviceable to them, than this renewal of their surface, as is attested by Columella. Let not the husbandman imagine that he will have less hay when only three fourths of his usual extent of land are under grass: for, in fact, it is not the quantity of the land, but the care which is taken of it, that gives plenty of hay."

When a soil of this kind is laid down for meadow, great care should be taken to slope it down gently, from the middle, in such manner that no water may rest on any part of it. If the extent is large, small ditches should intersect the meadow into as many divisions as shall be necessary to form a sufficient drain for the waste water, and the spaces between these ditches may be gently raised. In an upland pasture on such a soil, ridges should be raised inclining a little from the horizontal, that the furrows may be so many drains, as before directed in the ploughing of such soils, to prevent their becoming spewy or wet: for as the rain cannot descend beyond the clay, it will glide along it, till, collected in such quantities as to form a small stream, it issues forth at the surface, usually loaded with some mineral quality imbibed from the earth underneath.

When the soil is a rich or light loam, the plough will not be so necessary; as such meadows or pastures may be repaired by the means which will be pointed out in the directions hereafter given for the improvement of the meadows already laid down to grass. *See the article* GRASS *and* PASTURE.

Black, rich mould, requires but a moderate quantity of water: just sufficient to give action to the fertilizing particles it contains. The watering here should be frequently repeated, rather than long continued.

It is a general rule, that sandy or gravelly soils require watering the most of any; because whatever moisture they receive, sinks through them too speedily. But it may be doubted, whether this very reason for watering them be not one of the greatest of objections against their being watered, at least so much as is generally directed: for the water not only passes rapidly through these soils, but it may carry down with it through the sand or gravel, the finer and richer particles of the shallow mould usually found upon such soils, and thereby rather impoverish their surface. It would therefore seem advisable, to let water in upon such soils only occasionally, to refresh their verdure, when their surface is too dry: and to give it a pretty quick current, that it may reach to a greater extent of surface: for if it runs slow, it sinks too fast.

It is a question whether pastures newly laid down to grass, after having been arable land, ought to be watered at all during the first year. The judicious author of one of the ingenious dissertations in the memoirs of the Berne Society consulted on this subject an intelligent farmer, who had experienced the effects of watering, and of not watering, these new pastures, as some call them, and was answered, that they had yielded the greatest quantity of grass the first year, when they had been watered, but that the crops had always dwindled in the succeeding years: whereas those that were left dry till autumn, and then only begun to be watered, had made ample amends during the following years, for the scantiness of their produce in the first. This husbandman was therefore of opinion, that it is best not to water these meadows before the autumn; and he added a farther very sensible reason, namely, that as these new meadows still retain some portion of the manure laid upon the land the year before, when it was sowed with corn, the letting in of water upon them, while the mould is yet extremely loose and light, will be apt to carry off those rich remains of manure, which will otherwise incorporate with the soil, as it acquires more consistence.

A very wrong custom which prevails among our farmers, in general, with respect to low meadows, is, that of flowing them during the whole winter. The roots of all the sweetest kinds of grasses are thereby destroyed, and only such left as are natives of marshes, which are coarse and sour, and which no cattle will eat.

The method which Mr. Miller proposes for the management of these meadows, is never to flow them till the middle or latter end of March, excepting once or twice in the winter, when such floods happen, as bring down a great deal of soil from the upper lands: for then it will be of great service to let such water in upon the meadows, that the soil may settle there: but the sooner the wet is drained off after this is lodged, the greater will be the benefit done to the meadows. By letting on the water frequently, from the end of March to the middle of May, the growth of the grass will be greatly assisted, and there will not then be any danger of destroying its roots.

River water, which is universally acknowledged to be the best for this purpose, cannot be so beneficial when the stream overflows its banks, and runs rapidly over the pastures, as when its course is slow; and still much less than when it stagnates. It therefore is advisable to fence in every meadow liable to be thus overflowed, in such manner that it cannot be flooded, but at the owner's pleasure, by opening proper sluices. But as the produce of many meadows will not bear this expence, the proprietor, or farmer, should, if possible, prevent the too hasty current of the water, by raising at their upper end, or wherever else it may be necessary, such fences as shall render the water which flows sidewise upon the meadow, rather a back, or standing water. Great advantages will arise therefrom. The finer mould will no longer be carried away by the strong current of the river, which, instead of robbing the soil, will then deposit a rich sediment, and thereby greatly fertilize the land.

The water of mineral springs should not by any means be brought upon pastures; because they are either destructive of grass, or produce only a very harsh coarse kind of it.

We shall close this subject with the following remarks made by the judicious author of one of the before-mentioned dissertations in the Memoirs of the Berne Society, and which deserve the serious attention of every husbandman who would water his pastures with due care.

"Many people imagine, that the whole art of watering meadows consists in making good channels, and in opening and shutting the sluices at proper times. But this is not enough: for so long as the water flows in a meadow, the farmer should visit all his channels once or twice a day, with a shovel, hoe, or three grained fork in his hand, and examine carefully whether any of them want cleansing or repairing. Sometimes he will find a channel choaked with slime; in other places he will see the water spread too far, or not far enough; and in others again he will observe it not rise high enough to overflow its channel, so that the

neighbouring ground is not watered at all. He will immediately endeavour to remedy theſe defects, according to the exigency of the caſe, whether by clearing away the muddy ſlime, heightening the banks of the channel, lowering them, giving a freer current to the water in ſome places, and checking its courſe in others, according to the nature of the ſoil; or by cutting new channels in ſome places, and laying ſods or ſluices acroſs others, to divert the ſtream from ſuch parts as are ſufficiently moiſt, and turn it to others which want watering: for it frequently happens that, even in the ſame meadow, though not a large one, there are very different ſoils, each of which requires the aſſiſtance of water, but in different degrees. In ſhort, the careful huſbandman will not ever viſit his paſtures without noticing in them things which may be altered and amended."

The farmer who has improved his meadows according to the foregoing directions, may expect abundant recompence in plentiful crops of graſs.

When graſs is to be fed off, it ſhould not be permitted to ſtand till it grows high, becauſe the cattle will then trample under foot great part of it, which they afterwards will not eat. The prudent huſbandman will alſo vary the kinds of cattle fed upon it. *See the article* HAY.

Meadows that are often mowed for hay, are thereby ſo much impoveriſhed, that unleſs they are of an extraordinary rich ſoil, it is neceſſary to refreſh them frequently with manure, which is commonly done by ſpreading the manure upon the land in the autumn or ſpring. M. de Chateauvieux invented a machine with three ſharp coulters for cutting the land about 6 or 7 inches deep, that the manure laid upon it, might be waſhed into the inciſions made by the coulters, which alſo cutting the old roots of the graſs, many new roots were produced, and made a very great improvement, particularly, where the meadows were hide bound, or over-run with moſs; he called this inſtrument a cutting plough.

Mr. Wynn Baker added two coulters, and named it a *ſcarificator*, and not a plough, becauſe, as he rightly obſerves, a plough is an inſtrument that raiſes and turns a furrow, but the ſcarificator does not; for it only makes parallel inciſions in the ſurface, at about three or four inches diſtance one from another, but does not raiſe or turn the land.

This is a very uſeful inſtrument for the purpoſe of improving both meadows and paſtures, which it does by cutting only, and without manure; but when the land is alſo manured at the ſame time, the improvement is very remarkable, encreaſing the crops to a great degree, and alſo improving the quality of the graſs; as has been experienced in ſeveral places in England and Ireland.

It is farther remarkable, and has been proved in practice, that if the land is firſt ſcarified, and then manured, the improvement is greater, than ſcarifying the land after laying on the manure.

Dung is not ſo proper for this uſe, as compoſt beaten ſmall; but aſhes, or dry powdered manure is beſt: for that is ſoon waſhed by rain, into the traces made by the coulters.

The ſcarificator does not work ſteady in very ſtony land, the ſtones being apt to throw it out of its work. —In that ſort of land, the ſpikey roller may be two or three times run over it; which if done when the land is moiſt with rain, the ſpikes will break the turf, and if alſo manured, will make a conſiderable improvement: tho' not ſo much as when ſcarified; becauſe that goes deeper, and cuts the roots of the graſs, by which they are multiplied.

It is an advantage, in this method of improvement, that a much leſs quantity of manure is neceſſary, than in the uſual way, of ſpreading it all over the land without ſcarifying it.

MELILOT, a plant of the trefoil kind, and grows in ſuch abundance among the corn in many parts of England, particularly in Cambridgeſhire, as to be a moſt troubleſome weed; for it is hardly poſſible to ſeparate it from the corn in reaping, ſo that they are houſed together, and the ſeeds of the melilot, which ripen about the ſame time as the corn, are threſhed out with it, after which, they being likewiſe heavy, it is very difficult to ſeparate them. If but a few of theſe ſeeds are ground with the corn, they will ſpoil the flour; for the bread, or whatever elſe is made with it, will have a ſtrong taſte and ſmell like melilot plaiſter. The roots of this plant are ſtrong and woody, and from them ſpring out ſeveral ſtalks, which riſe from two to four feet high, according to the goodneſs of the land. Theſe ſtalks branch out, and are garniſhed with trifoliate leaves, having oval ſawed lobes of a deep green colour. The flowers are produced in long ſlender ſpikes, which ſpring from the wings of the ſtalks. They are of a bright yellow, ſhaped like the other butterfly flowers, and are ſucceeded by naked ſeeds, which ripen in Auguſt.

MESLIN-CORN, wheat and rye mixed together.

MET, a ſtrike, or four pecks.

METEYARD, or METERWARD, a ſtaff of a certain length for taking meaſures.

MIDDING, a dunghill.

MIDGE, a gnat.

MILDEW, a diſtemper very deſtructive to corn.

"This diſtemper, ſays M. Duhamel, attacks the blades and ſtems of corn, which it covers with a powder of the colour of ruſt of iron, when at the height of their vegetation. This ſubſtance doēs not adhere ſtrongly to the blades; for I have ſeen the hair of white ſpaniels full of this powder, after they have run through a field attacked with this diſeaſe. It is likewiſe known, that if the infected wheat is waſhed by a plentiful rain, the ruſt diſappears almoſt entirely, and the grain ſuffers little from it. The French give it the name of ruſt, from the colour of the powder, and it ſeems to be the ſame diſtemper which the Roman writers call *rubigo*.

"The cauſe of this diſtemper is uſually imputed to dry gloomy weather, happening while the corn is at the height of its vegetation: and in effect I have many times obſerved, that when a hot ſun has ſucceeded ſuch dry hazy weather, the corn was ruſted within a few days after.

"This diſtemper is not common in clear and dry hot years: but when the ſpring is wet, the fineſt fields of wheat run great hazard of being deſtroyed by the mildew, which generally appears upon the breaking out of the ſun in the morning, after cloſe and ſultry weather, during which there has not been any dew. The ruſty powder then gathers upon the blades in ſuch quantities as to cover the earth two feet around. M. de Chateauvieux cut off the mildewed blades, and found the trial anſwer: the ſame plants produced new blades, and throve much better than thoſe on which this operation had not been performed: but this cannot be done except when the corn is very young.

"This

"This diſtemper it very fatal: for the fineſt wheat is ſuddenly brought almoſt to nothing, when it is entirely attacked with it.

"If it attacks the plants while they are young, and before their ſtems begin to riſe, the miſchief is ſometimes not very great, provided there comes on a ſeaſon favourable to their farther growth. In this caſe, they are only weakened, as if they had been fed or mowed. They ſhoot out anew, and produce ears: though their ſtraw is ſhorter, and thoſe ears are ſmaller, than they would otherwiſe have been. But if both blades and ſtalks are mildewed at the ſame time, the farther growth of the plant is ſtopt, and the grain gets ſcarce any more nouriſhment; ſo that the crop is exceedingly diminiſhed.

"This grievous diſtemper well deſerves the ſerious attention of every inquirer into nature, who intereſts himſelf in the progreſs of agriculture; and I cannot too ſtrongly exhort all ſuch to endeavour to inveſtigate its cauſes and remedies.

"Several authors have, very improperly, confounded this diſtemper with others to which corn is ſubject. M. Tillet imputes it to a ſharpneſs in the air in dry cloudy weather, which breaks the veſſels interwoven with the ſubſtance of the blades and ſtem, and makes them diſcharge a thick oily juice, which, drying by degrees, is turned into that ruſty powder. In effect, if we examine with a microſcope, or only with a good magnifying-glaſs, plants of wheat, whoſe ſtems and leaves are covered with ruſt, we ſhall ſee diſtinctly ſmall crevices in the places where this powder lies, and ſhall diſcern, from ſpace to ſpace, in the membrane of the plant, openings through which it ſeems probable that the juices, afterwards converted into this ruſty powder, iſſues, and over which one may perceive ſome ſlight fragments of the membrane imperfectly covering thoſe cracks and openings.

"In ſupport of this opinion, M. Tillet quotes a memoir of M. de Renéaume, publiſhed in the Tranſactions of the Academy of Sciences, on the extravaſation of the nutritive juice of the walnut trees in Dauphiny: of the manna of Calabria, which is not a dew, but the extravaſated juice of the leaves of a kind of aſh; and what M. Muſchenbroek relates in his Phyſical Eſſays of thick and oily juices which iſſue out at the excretory veſſels of leaves, and ſtop there in the conſiſtence of honey.

"However this may be, the ruſt of corn is the conſequence of a diſtemper of which the firſt cauſe is not yet ſufficiently known. It is a miſtake to think, that the ruſt and mealy powder which may be ſeen on many plants are a collection of eggs laid there by inſects, and that this is a ſource of other innumerable inſects very fatal to vegetables. By admitting the extravaſation of the nutritive juices, as the cauſe of theſe diſtempers, we ſhall conceive that the ruſt of corn, the honey-dew, the mealy-dew, and all the unctuous ſubſtances which are found upon gramineous plants, depend on the quality of the juice concentrated in the plants, upon the outſide of which it manifeſts itſelf by evaporation, and is converted ſometimes into an impalpable powder, and ſometimes into that thick ſubſtance which is red on garden beans, or a ruſty colour on all kinds of corn, greeniſh on the plumb-tree, yellowiſh on the aſh, white on the larch-tree, &c.

"Theſe obſervations and reflections ſtill leave undoubtedly much room to wiſh for farther information. They will, however, help to point out the path to a careful obſerver, and ought to excite philoſophers to exert themſelves in a matter of ſo great importance to the public. We confeſs that we have tried to produce the ſame effects as the dry hazy weather, which occaſions the ruſt, by applying to the leaves of many plants, acid and corroſive liquors, to others alkaline or ſpirituous, and frequently ſuch clammy glutinous ſubſtances as might ſtop the perſpiration without hurting the texture of the plants: but none of theſe trials have produced any thing like ruſt. However, who can tell how far experiments may lead the judicious and attentive? Some little circumſtances which may have eſcaped us, might perhaps, if duly remarked, have led us to the object of our ſearch. The public welfare calls on all attentive obſervers, to exert themſelves on this very intereſting ſubject.

"Count Ginanni, in a memoir printed in the *Journal Economique*, for October 1761, treats expreſsly of this diſtemper, and ſays, he has obſerved, with the help of a microſcope, ſmall worms lodged between the two membranes of the blades.

"If we had any certain knowledge of the cauſes of the ruſt, we ſhould probably be enabled the more eaſily to find preſervatives againſt it: but in the mean time it will be right to collect every obſervation made by lovers of agriculture; becauſe they will certainly afford uſeful lights at one time or other.

"M. de Chateauvieux obſerved, in the autumns of 1753 and 1754, that when the corn was ruſted, the ſecond crop of hay was ſo likewiſe. The graſs turned from a fine green, to the ugly ruſty colour of the corn: it was covered with the ſame kind of powder, and its quantity diminiſhed ſenſibly every day; and as the whole of a field of corn is not uſually affected at the ſame time, ſo this diſtemper extended only to ſome parts of the meadow.

"The cauſe of this diſtemper is undoubtedly the ſame in corn and in graſs; but its effect is not exactly ſimilar. It may deſtroy annual plants, ſuch as corn, entirely; but in perennials, like graſs, it deſtroys only the leaves or blades. May not the preſervation of theſe laſt be owing to the taking off of thoſe leaves or blades, when they are cut for hay? But this is only conjecture; for I own that I have not yet made any obſervation on this head.

"As the ſtraw of ſmutty, mildewed, or ruſted corn, and by the ſame rule graſs, in a ſimilar condition, may poſſibly give diſeaſes to cattle fed with it; it were to be wiſhed, for the public good, that a parcel of fodder, the moſt infected with either of theſe diſtempers, ſhould be ſet apart for the food of a certain number of beaſts. If cows or oxen, for example, remain ſound and healthy after having been fed with this growth for two or three months, we may afterwards give it them with confidence and ſafety: but if, on the contrary, they are viſibly diſordered by it, the remedy is eaſy and at hand, by feeding them with good wholeſome hay, which will carry off the diſeaſe, then known to proceed from the bad quality of the food."

The air in England ſeldom is ſo dry as to exhale all the moiſture of the glutinous exudations, and thereby convert them into the ruſty powder above deſcribed. The extravaſation of the ſap ſeems to account for this diſtemper of plants in a much more rational manner, than the thick clammy dews which ſome of our authors ſpeak of, as falling in cloſe weather, ſtopping the perſpiration of vegetables, and hindering their juices from aſcending to nouriſh the flowers, &c.

Mr. Miller takes the true cauſe of the mildew's appearing moſt upon plants which are expoſed to the eaſt,

eaſt, to proceed from a dry temperature in the air when the wind blows from that point; in which caſe it ſtops the pores of plants, and prevents their perſpiration, whereby their juices are concreted upon the ſurface of their leaves; and that concretion being of a ſweetiſh nature, inſects are incited thereto. Thoſe inſects finding, their proper nutriment, depoſit their eggs, and multiply ſo faſt as to cover the whole ſurfaces of plants, and, by corroding their veſſels, prevent the motions of the ſap. He thinks it very probable, that the excrements of theſe inſects may enter the veſſels of plants; and, by mixing with their juices, may ſpread the infection all over them; for it is obſervable, that whenever a tree has been greatly infected by this mildew, it ſeldom recovers in two or three years, and many times never is entirely clear from it after. But he by no means allows theſe inſects to be the firſt cauſe of this diſtemper, as ſome have miſtakenly imagined.

It is obſervable, that mildews and blights frequently attack only one ſort of corn, or fruit, and leave the other ſpecies unhurt.

Count Ginanni diſtinguiſhes two principle kinds of mildew, one of which ſpots the blades and ſtems of corn, and dries upon them, without ever producing any powder; but penetrates through their outward covering, and entirely dries them up. This is generally of a pale colour, either reddiſh, yellowiſh, purpliſh, or blackiſh; and ſometimes a variegated mixture of many colours. The other ſpeedily covers the plant with a moiſt and thickiſh ſubſtance, which afterwards becomes dry, and turns into a powder of one or other of the abovementioned colours, but moſt commonly reddiſh or yellowiſh. This, ſays he, always fades, corrodes, and ſeparates the outer ſkin from the plant. The former extends to every ſpecies of corn; but the latter is almoſt peculiar to wheat in the blade; though it is ſometimes ſeen upon oats and barley. Some may perhaps reckon, as a third ſpecies of mildew, a yellowiſh ſubſtance, or powder, ſometimes ſeen under the membrane of the blades of corn, where it raiſes bliſters, makes many little holes and cracks, and corrodes the fibres; and perhaps they may not be wrong in accounting it ſuch.

He is confident that this diſtemper is the rubigo of the Latins.

"For the vegetation of ſeeds," continues count Ginanni, "after they have been properly depoſited in the earth, for their fecundity, their ſprouting, and the increaſe and well-doing of the plants produced by them, it is neceſſary that the action of the fluid which pervades them be duly regulated: for that fluid is operated on in them by the ſame cauſes which affect the liquor in a thermometer and barometer, or influence the hygrometer; ſo that whenever its due courſe is obſtructed or weakened, or its quantity too much encreaſed or diminiſhed, or its quality injured in any manner whatever, a diſtemper will enſue. This fluid is ſubject to two laws of motion; the one, ſimply as a fluid, which conſiſts in an inteſtine agitation of its minuteſt particles; and the other, as a fluid whoſe progreſs is through the various ducts of the plant. By the firſt of theſe motions it aſſimilates to itſelf all the homogeneous particles, and expels the heterogeneous; and by the ſecond it penetrates into the various parts where thoſe functions are to be performed. When both theſe motions proceed naturally, equally, and juſtly, the ſecretions are duly made, and every part of the plant continues ſound and healthy: but when that harmony is interrupted, the fluid degenerates from its natural ſtate, and the ſecretion becomes vitiated and depraved.

"Now, if the ſeveral diſtempers to which plants are ſubject are owing to the various ways in which the regular action of this fluid may be hurt; and no one diſtemper can, in my opinion, happen to corn, which will not fall under one or other of theſe circumſtances, we ought to ſearch after and endeavour to diſcover them, in order to be thereby enabled to prevent, or to cure them, that mankind may be the leſs expoſed to the injuries reſulting therefrom. But as the knowledge of theſe particular things depends on an adequate conception of thoſe which are univerſal; and as the univerſal cauſes of diſtempers are external or internal, and the diſtempers themſelves ſeem particularly to depend on the conſtitution of the air, or an alteration of food, or on both; ſo when we have diſcovered the genus of the cauſe, it will not be very difficult afterwards to find out the ſpecies, and the efficient cauſe. So many and various have been my reſearches, obſervations, and experiments, and ſuch the lights which they have afforded me, that, if the love of truth did not oblige me to be diffident of myſelf, and if I was not thoroughly perſuaded, with that great philoſopher and mathematician Gallileo, that we cannot in general underſtand how nature acts, becauſe ſhe makes uſe of means frequently beyond the reach of our comprehenſion, I ſhould, perhaps, flatter myſelf with thoughts of having diſcovered the origin of ſome of the diſtempers to which corn is ſubject whilſt in the blade."

He then gives his opinion of mildews, which is, that they come on very early in the morning, and cover the corn almoſt inſtantaneouſly, after a cold night, which has been preceded by a hot day; and that the ſap or moiſture which then iſſues out of the plant, is gradually exhaled, and forms the ruſty powder which characteriſes this diſtemper.

After trying in vain all the boaſted remedies of the ancients (highly commended by ſeveral modern writers) ſuch as burning of ſtraw and weeds in a ſerene night, when not a breath of air is ſtirring, or the wind, if any does blow, comes only from the weſt, ſticking up branches of lawrel, &c. ſprinkling the corn with tobacco, and with pepper; and ſtrewing among it, as Dr. Hales adviſes, woollen rags ſteeped in a ſtrong ſolution of ſalt of tartar, or ſea-ſalt, or in good white-wine vinegar, and afterwards well dried, even from which laſt he cannot ſay that he has found much benefit; the method long ago directed in this caſe by Mr. Worlidge, of making two men go at a proper diſtance from each other in the furrows, holding a cord ſtretched ſtrait between them, and carried ſo as to ſhake off the dew from the tops of the corn, before the heat of the ſun has thickened it, ſucceeded beſt of all; to which he adds as an excellent preſervative, keeping the ground perfectly free from weeds, and ſtirring the earth frequently between the plants. I ought not to omit here Mr. Worlidge's farther obſervation, that "the ſowing of wheat early has been eſteemed, and doubtleſs is, the beſt remedy againſt mildews; for by this means the corn will be well filled in the ear before thoſe dews fall, and the increaſe will conſequently be the greater. For curioſity ſake, wheat was ſowed in all the months of the year: that ſown in July produced ſuch an increaſe as is almoſt incredible. In France, they generally ſow before Michaelmas.

"Bearded wheat is not ſo ſubject to mildews as the other, its awns keeping the dew from the ear."

MILKNESS, a dairy. *See* DAIRY.

MILLET, the name of a plant which grows naturally in India, from whence it was firſt imported into Europe, is greatly cultivated in Italy, Spain, and the ſouthern parts of France, for the food of men, as well as for that of poultry: and we alſo raiſe it in ſeveral places in England; though we have our annual ſupply of this grain from the Eaſt-Indies, which makes ſome people erroneouſly call it Eaſt-India wheat.

It delights in a light ſandy ſoil, prepared in the ſame manner as for maize; and in ſuch land it branches out into many ſtalks, ſometimes thirty or forty, not unlike reeds either in their ſhape or leaves, of which there is one at each joint. The top of each ſtalk is terminated by a large looſe panicle, which hangs on one ſide, with a chaffy flower, which is ſucceeded by a ſmall round ſeed, about the bigneſs of turnip or cabbage-ſeed, of a yellowiſh white colour in one ſort, and of a dark red, inclining to black, in another. The ſmall millet, and the large, a diſtinction which ſome writers make, are only varieties of the ſame ſort. It is likewiſe ſaid to thrive extremely well in ſtrong land: but will not do in ſtoney ground, or where the bottom is either chalk or clay.

Mr. Miller directs ſowing this grain in the beginning of April, which may be very right in this country, that it may be ripe in Auguſt: but in warmer climates, the general rule is to ſow it either between the middle and the end of May, or at Midſummer. The former is reaped at the end of September, and the latter about the end of October.

The ſeed is ſowed in furrows, very thin, and covered with the plough or rake. The largeſt ſort ſhould be ſowed thinneſt, becauſe it branches moſt. When the plants are about a month old, the ground ſhould be ſtirred round them with a hand-hoe, as well to lay freſh earth to their roots, for they require a great deal of nouriſhment, as to clear them from weeds, of which they will afterwards prevent any great increaſe, by over-topping them. At the ſame time, the millet ſhould be thinned wherever it grows too cloſe, ſo as to leave, in general, about ſix inches between each plant. The huſbandmen has nothing more to do to this grain till harveſt, excepting that, when it begins to ripen, he muſt take great care to protect it from birds, which would otherwiſe ſoon devour it. If preſerved from them, the returns are very great; for it is not eaſily hurt by drought or rain, nor is it ſubject to blight. Frequent ſhowers of rain are of great ſervice to it whilſt growing.

When the millet is ripe, its panicles are cut off near the uppermoſt joint of the ſtalk, with a knife, and put into baſkets or ſacks, in which they are carried home. they are then laid up in heaps, covered over with cloths, and after remaining in that ſituation five or ſix days, are ſpread upon the barn floor, threſhed out with a flail, and cleanſed, like other grain. Great care muſt be taken to dry it well in the ſun, before it is laid up in the granary: for it would ſoon ſpoil if the leaſt moiſture were left in it; this being of all grains the moſt difficult to keep, unleſs it be thoroughly dry: and, on the other hand, none keeps longer or better, after it has been well dried. It is not liable to the weevil: and though it ſhould be turned from time to time in the granary, yet if that happens now and then to be neglected, it ſtill keeps perfectly well.

It has been a conſtant obſervation, that the late ſown millet, I mean ſo late as Midſummer, had always had the greateſt number of abortive grains; that its panicles are ſmaller than thoſe of the ſame grain ſowed earlier; and that the crop was leſs plentiful.

The ſmall white millet, which is by far the moſt delicate, and of which excellent puddings, &c. are made, is the ſort chiefly cultivated in this country. The red, which is much larger and coarſer, is not uſed here, except, perhaps, for pigeons, poultry, and ſwine, for which laſt it ſhould be ground to meal: but the peaſants about Bourdeaux, where a great deal of it is raiſed in the poor light lands near that city, make of it a reddiſh, heavy, ill-taſted bread, difficult to digeſt. The culture of this ſort, which is Mr. Miller's *ſorgum*, is, in all reſpects, the ſame as that of the white; excepting that, as it grows much larger, the plants require more room.

Millet, either green, or after its grain is threſhed out, is very good fodder for cattle, for which uſe it may be ſowed thicker than for a crop of grain. Its many roots, large ſize, and quick growth, are ſaid to render it a great impoveriſher of the earth; for which reaſon ſome people pull up the roots, and plough the ground immediately, as ſoon as the crop is reaped: but others, more judicious, plough in the ſtubble and roots, which rot, and greatly enrich the ſoil: and indeed all other ſucculent plants, inſtead of being ſuch robbers as is commonly ſuppoſed, return to the earth, by the inſpiration of their leaves and perſpiration of their roots, even while they grow, perhaps as much as they borrow from it: for how ſhould it be poſſible for them to pierce into the very drieſt and hardeſt ground, as we frequently ſee they do, unleſs they perſpire moiſture through their roots? As this plant requires a great deal of nouriſhment, it would probably thrive beſt in the horſe-hoeing huſbandry.

The following account of the culture and amazing produce of the African millet, was ſent by the ingenious Mr. Burton, to the editors of the Muſeum Ruſticum.

"I cannot help mentioning to you, for the ſake of your practical readers, the African millet, *ſorghum*, *millium nigrum*, the culture of which is ſtrongly recommended by M. Tſchiffeli, who has written a paper on the ſubject, publiſhed in the Tranſactions of the Berne Society. There is ſomething ſo very extraordinary in this paper, that I am ſure you will think a ſhort abſtract of it worthy to be inſerted in your work.

"Monſ. Tſchiffeli obſerves, that this millet is a plant which merits the huſbandman's utmoſt attention, and that for the following reaſons: 1. It thrives in all ſorts of ſoils. 2. It neither requires much dung, nor a great deal of tillage. 3. It is not ſubject to the depredations of birds, which are very fond of panic and common millet. 4. It yields very large returns. 5. Laſtly, it does not exhauſt the land in proportion to the largeneſs of the crops.

"He farther ſays, that the ſeed of this ſort of millet comes originally from Africa, where it ſupplies the inhabitants with food; but that they are miſtaken who thence conclude it will thrive only in hot countries: for providence has endowed it with ſuch excellent qualities, that it may, with ſucceſs, be cultivated in countries much colder than Switzerland.

The firſt ſeed of it M. Tſchiffeli received was from Mr. Engel, magiſtrate of Eſchalens, who procured it from Pomerania, it being ſent to him by the celebrated doctor Schreber, in the ſpring of the year 1760. M. Tſchiffeli had from him about a ſpoonful.

"In

"In the month of May of the ſame year, he ſowed it on a gravelly ſoil, hard and ſtony, very much expoſed to the north wind, and which the year before had borne ſome very indifferent bere. In the month of February preceding, ſome human ordure had been laid on this land; and in May the clods were all broken before the ſeed was ſpread: having ſo ſmall a quantity of ſeed, he took care to ſpread it very thin; and to this does he aſcribe the ſtalks running to the height of eight feet or more. The ears were above ten inches long; and if a ſhower of hail had not fallen on it, the ſpoonful would probably have produced him at leaſt a peck. This accident occaſioned the loſs of half his ſeed: he had, however, enough left to divide with his friends in Switzerland, as well as elſewhere.

"In the month of May, 1761, he ſowed about a quart of ſeed, or near a pound, on ſome land, from which he had firſt pared off the turf, and afterwards burnt it. The ſpace on which the ſeed was ſown might be about twenty paces long, and ten broad.

"Some time before harveſt, M. Tſchiffeli perceived he ſhould have allotted three time as much ground for that quantity of ſeed. The ſtalks, which were very cloſe, were interwoven one with the other, like the hairs of a bruſh. They were ſcarcely five feet in height, and the ears alſo were much ſhorter than the preceding year: this, however, did not prevent his reaping about ſeven pecks, or above fifty for one. In the year 1762, he ſowed about four pounds of ſeed, or about half a peck, on ſome pretty good land, being in quantity about thirty ſquare rods or perches. The year before, the ſame land bore potatoes; and as he had laid on no freſh manure for the millet, and had neglected to plough it before the winter (for it was only turned over with a ſpade before ſowing) he imagined he had not ſown the ſeed too thick: but in this he was greatly miſtaken; the millet came up almoſt as thick as the year before, and as he had not the courage to thin it, which would have been right, the ſtalks and ears were ſhorter than the firſt year.

"Notwithſtanding this, he was enabled to reap twenty buſhels, being ſix hundred and forty pounds; of courſe, a return of a hundred and ſixty for one.

"There can then be no reaſon to doubt, but that land of a moderate quality, ſown thin, and properly prepared, will produce, one year with another, one hundred buſhels of millet per acre; for our huſbandman got as much in proportion, though his land was but ſlightly tilled, and he manifeſtly ſowed his ſeed too thick. This is certainly a moſt wonderful increaſe, in what light ſoever we behold it.

"What grain is there which in the open field will yield a return of one hundred and fifty for one, and which, at the ſame time, will ſell ſo well, for in price it is on a footing with wheat? It is true, it yields a heavy, crumbly, and indifferent bread; but if it is made into pottage, it is excellent, very nouriſhing, and of exquiſite flavour. Not only M. Tſchiffeli's ſervants and workmen were very fond of millet thus prepared; but he himſelf prefers it to the beſt rice, which will not grow in Switzerland, and comes at a much higher price.

"The millers in Switzerland, whoſe reputation is not of the beſt, return a good third of a buſhel of millet-meal for every buſhel ſent to them, after deducting toll, bran, waſte, &c. Now this ingenious writer knows by experience, that ſuch a quantity, when made into pottage with milk, will ſerve at leaſt fifty men for a meal. Surely they cannot be fed at a cheaper rate. In times of ſcarcity millet muſt be of great uſe, as with potatoes the poor might live comfortably.

"An acre of land requires, at moſt, but ten pounds of ſeed; and M. Tſchiffeli ſays he can, from his own experience, venture to aſſert, that millet does not impoveriſh land in proportion to its produce. The land he ſowed in 1760 and 1761, yielded, the following year, fine plants of Dutch clover, and rye-graſs in as great plenty, with reſpect to the crops, as the neighbouring land."

MILL-HOLMS, watery places about mill-dams.

MISLEN, the ſame with maſlin, or maſlin-corn. *See* MASLIN-CORN.

MIST, a meteor conſiſting of groſs vapours floating near the ſurface of the earth.

The bluiſh miſt, which we ſometimes ſee on our fields and paſtures in a morning, though often innocent, yet has been in ſome places found to be the actual cauſe of murrain, and other fatal diſeaſes among the horned cattle.

Dr. Winklar gives, in the Philoſophical Tranſactions, an account of a murrain affecting the cattle in Italy and other places, which was evidently ſeen to ſpread itſelf over the countries in the form of a blue miſt. Wherever this was perceived, the cattle were ſure to come home ſick; they appeared dull and heavy, and refuſed their food; and many of them would die in four and twenty hours. Upon diſſection there were found large and corrupted ſpleens, ſphacelous and corroded tongues; and in ſome places thoſe people who were not careful of themſelves, in their management of the cattle, were infected and died as faſt as themſelves. The principal cauſe of this diſeaſe ſeemed to be the exhalation of ſome unwholeſome ſteams from the earth; and it was obſervable that there had been three earthquakes in Italy the year before it happened. The method of cure which ſucceeded beſt, was this: as ſoon as any beaſt appeared to be ſick, they examined the tongue, and, if apthæ, or little bliſters, were found on it, they ſcraped it with a ſilver inſtrument made with ſharp teeth at the ſides, till it bled in all thoſe parts where the apthæ were; the blood was then wiped away with a cloth, and the whole tongue waſhed ſeveral times with vinegar and ſalt. After this, the following medicine was given internally: take of ſoot, brimſtone, gunpowder, and ſalt, of each equal parts; mix theſe in as much water as will make them thin enough to be ſwallowed, and let a ſpoonful be given for a doſe three or four times a day. The cattle which were in health had this medicine given them, as well as the ſick; and the conſequence was, that very few died in Switzerland, while almoſt all died in other places.

It was very remarkable that the contagion, on this occaſion, ſeemed to travel ſlowly and regularly on; it came at the rate of about two German miles in twenty-four hours: this it kept regularly to, during the whole time of its raging, and never appeared in very diſtant places at the ſame time.

The whole ſurface of the earth emitting theſe effluvia, no cattle eſcaped them in the courſe of their way; but thoſe which were kept within doors at rack and manger fell ill at the ſame time, and in the ſame manner with thoſe in open fields. Dr. Slare was of opinion, that it was owing to certain inſects which could not fly faſter than at the rate of two German miles a day; and that they travelled regularly, and ſpread the miſchief where they paſſed; but there wanted ſome judicious perſons, verſed

verſed in theſe obſervations, to have examined both the ſtate of the air, and the beaſts, on this occaſion. *Philoſ. Tranſactions*, Numb. 145.

MIXEN, a dung-hill.

MIZZY, a bog, a quagmire.

MOAR-LOVRE, a term uſed to expreſs a peculiar diſtemperature of corn, generally comprehended under the common term of a blight. In this caſe the earth ſinks away from the roots of the corn, and leaves the plant ſtanding in great part above ground with naked roots; theſe being too weak to ſupport the ſtalks, the plants fall, and the ears become light. This is a diſtemperature peculiar to corn growing on light and looſe lands. *Tull's Horſe-hoeing Huſbandry.*

The remedy is this: turn a ſhallow furrow againſt the rows, when they are ſtrong enough to bear it, and the mould is fine and dry; the motion of the ſtalks with the wind will draw in this looſe powder, and it will ſpread itſelf equally among all the rows, ſettle about the roots, and cover them.

MOLE, a ſmall animal too well known to the huſbandman, from the miſchief it does in the fields, by looſening of the earth, and deſtroying the roots of corn, graſs, and other vegetables.

The common method of deſtroying them is by traps, made in the following manner:

Take a ſmall board, about three inches and a half broad, and five inches long: on one ſide thereof raiſe two ſmall round hoops or arches, one at each end, like the two hoops or bails of a carrier's waggon, capacious enough for a mole to creep through eaſily: in the middle of the board make a hole about the bigneſs of a gooſe-quill, and have in readineſs to put into it a ſtick about two inches and a half long, fitted at one end to the hole, and a little forked at the other. Cut alſo a hazel or other ſtick, about a yard, or a yard and a half long, which will riſe with pretty ſtrong elaſticity, when it is ſtuck into the ground; and to the end of this ſtick faſten a very ſtrong nooſe of horſe-hair, made ſo as to ſlip eaſily. Have likewiſe in readineſs four ſmall hooked ſticks: then go to the furrow or paſſage of the mole, and after you have opened it, fit in the little board with the bended hoops downward, ſo that when the mole paſſes that way, it may go directly through the two ſemi-circular hoops. But before you fix the board in this manner, put the hair ſtring through the hole in the middle of it; place the nooſe in a circular form, ſo as to make it anſwer to the two hoops; put the ſmall ſtick before-mentioned gently into the hole in the middle of the board, ſo as juſt to ſtop the knot of the hair ſpring, without entering ſo far as abſolutely to tighten it. Then faſten the board down with four hooked ſticks, and cover it with earth. When the mole, paſſing in its furrow, comes into this trap, it will diſplace the ſmall ſtick that hangs perpendicularly downward, the knot will then be drawn through the hole, and the nooſe inſtantly ſtreightened by the riſing of the end of the hazel ſtick to which it is faſtened, which will catch the mole round the neck.

Others, watching their motions in the morning and evening, which are their uſual times of ſtirring, dig them out in a moment with a ſpaddle: and about March, which is their time of breeding, numbers of their young ones may be deſtroyed by turning up their neſts, which are generally in the greateſt hills; and the old ones who come to ſeek their young will preſently be taken.

Some commend the pot-trap, which is a deep earthen veſſel ſet in the ground with the brim even with the bottom of the mole tracks. The ſeaſon for uſing this is when the moles couple, which is about the beginning of March, or perhaps ſomewhat earlier.

Mr. Worlidge ſays, they may be driven from the gardens, meadows, and other places where one would not chooſe to dig, by fuming their holes with brimſtone, garlick, or other unſavoury things: and that the putting a dead mole into a common haunt, will make them abſolutely forſake it: to which Mr. Mortimer adds, but only upon report, that white hellebore and the roots of palma-chriſti, dried, powdered, and ſifted through a fine ſieve, then mixed with barley-meal and eggs, and worked into a paſte with wine and milk, will kill them, if laid in little pellets under their hills.

The writers of the Memoirs of the Society of Agriculture at Angers, recommend hazel-nuts boiled in an infuſion of hellebore, as a ſure method of deſtroying moles. Two or three of theſe nuts are to be laid under each mole hill, and the creatures, by being fond of that fruit, will be poiſoned by eating them.

The way to remove mole-hills and ant-hills, which are not only diſagreeable to the ſight, but detrimental to the paſture, and a great hindrance to the mowing of the graſs, eſpecially where they are numerous, is particularly in regard to the latter, either to divide the turf which grows over them, into three parts, with a ſpade, or other inſtrument, then to pare it off each way, to dig out the middle or core of the hills, to ſpread this mould over the other ground, to leave the holes open all the winter, that the ants may be killed, or lay the turf down again in the ſpring, and to roll thoſe ſpots after the re-inſtated turfs are ſettled, and their graſs has taken freſh roots; or, which is a more expeditious method, to ſcoop them out at once, with what Mr. Bradley calls a ſcolloped mole-hill plough, made in the following manner.

From *a* to *a* (Fig. 1. Plate XX.) is an iron plate, about five inches over, and above an inch thick at the back, *b b* is the ſcolloped ſpade, or tongue, of the plough, and about a foot over at the wideſt part. This, from the ſharp point, grows thicker by degrees, till it comes to the back, which ſhould be a full inch thick. The iron muſt be well hardened, and very ſharp at the edges. *c c* is the paring plate, which ſhould be very ſharp on the fore edge, and, with the ſcolloped ſpade, ſhould be four feet long from *a* to *a*. *d d* are iron ſockets, in which are fixed the plough handles, or ſtilts, *e e*. At *a a* are foot-links to ſet the harneſs on, for one horſe, or two horſes lengthwiſe, to draw by.

When this plough is uſed, the point of the ſcolloped ſpade muſt be ſet to the bottom of the hill, by raiſing the plough ſtilts, ſo that it may go into the ground; and when the hill is near cut through, the point ſhould be raiſed up again, by weighing a little on the ſtilts.

The hollow left by this plough will receive the rain as it falls, and this will drown the remaining ants.

After the mole and ant-hills, and other inequalities have been thus taken off, the beſt way is to carry them to a corner of the field, there to break them well to pieces, and mix them with a conſiderable portion of lime, or other manure ſuited to the ſoil, which will effectually deſtroy every remains of the ants, and convert the whole to good manure, which may then be profitably ſpread all over the

ſurface of the ground. The ſpots on which the mole, or ant hills ſtood, ſhould be looſened with a ſpade, then mixed with lime or other manure, and afterwards be laid down with clean graſs ſeeds.

This method is the moſt adviſeable of any, becauſe a fine graſs will be raiſed in thoſe places, inſtead of the coarſe benty growth which occupied them before.

MOLTEN-GREASE, a fat or oily diſcharge with the dung, and ariſes from a colliquation, or melting down of the fat of the horſe's body, by violent exerciſe in very hot weather.

It is always attended with a fever, heat, reſtleſſneſs, ſtarting and tremblings, great inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy. His dung will be extremely greaſy, and he will fall into a ſcouring; his blood will have a thick ſkin of fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part, or ſediment, is commonly a mixture of ſize and greaſe, which makes it ſo extremely ſlippery, that it will not adhere to the fingers, and the ſmall portion of ſerum feels alſo ſlippery and clammy. The horſe ſoon loſes his fleſh and fat, which probably is diſſolved and abſorbed into the blood; and thoſe that ſurvive this ſhock commonly grow hide-bound for a time, their legs ſwelling both before and behind, and continue in this ſtate till the blood and juices are rectified; and if this is not done effectually, the farcy, or ſome obſtinate ſurfeit, generally follows, very difficult to remove.

In the firſt place bleed plentifully, and repeat it two or three days ſucceſſively in ſmaller quantities; two or three rowels ſhould alſo be immediately put in, and cooling emollient glyſters, daily thrown up to abate the fever, and drain off the greaſy matter from the inteſtines. By the mouth give plenty of warm water, or gruel, with cream of tartar, or nitre, to dilute and attenuate the blood; which in this caſe is greatly diſpoſed to run into grumes, and endanger a total ſtagnation.

When the fever is quite gone off, and the horſe has recovered his appetite, gentle aloetic purges ſhould be given once a week, for a month or ſix weeks, in order to bring down the ſwelled legs; but if the purgative ingredient does not exceed half an ounce, or ſix drams of fine aloes, it only opens the belly gently; and, with the other medicines joined with it, paſſes into the blood, acts as an alterative, and operates both by urine and perſpiration: as will appear by the horſe's ſtaling plentifully; and the kindly feel of this ſkin. To this end give the following, which, repeated for ſome time, will intirely remove this diſorder.

Take of ſuccotrine aloes ſix drams, of gum-guaiacum powdered half an ounce, of diaphoretic antimony, and powder of myrrh, of each two drams: make into a ball with ſyrup of buckthorn.

Or it may be prepared with an ounce of aloes, ſix drams of diapente, and a ſpoonful of oil of amber.

Theſe will ſeldom take a horſe from his buſineſs above two or three days in a week; neither will he loſe his fleſh or appetite with them, which cannot be obtained by any other method of purging, and gives this greatly the preference in many caſes.

Two ounces of nitre mixed up into a ball with honey, and a dram of camphire, will alſo be found an excellent medicine for this purpoſe, as it will powerfully attenuate the blood, and promote the due ſecretions; to which end it ſhould be given every day for a fortnight, or three weeks. *Bartlet's Farriery, page* 168.

MOLTER, the toll of a mill.

MOOR, a very fine black mould, ſometimes found under a pretty thick ſward of graſs, but more frequently under moſs, or ſtraggling plants of heath.

It differs from peat, in that it does not ſtick together, nor has the fibrous roots, or bituminous viſcous quality of this laſt. Peat, when dry, becomes hard and firm: this falls into powder. It cannot be better deſcribed, than by comparing it to that ſubſtance which is found in hollow rotten willows, and other trees of that kind; which gives room to think that it ariſes from rotten plants. It is of a ſpungy nature, and ready to imbibe moiſture, which adds conſiderably to its weight. There is generally underneath it, as under moſt earths of this kind, a bed of clay, or ſome ſubſtance impervious to water: ſo that the particles of bodies decayed on their ſurface, not being admitted into the ſoil, remain upon that ſurface, dry there, and increaſe its thickneſs, according to the continuance of the cauſe.

If this kind of ſoil is collected in a place where running water, in rainy ſeaſons, brings with it clay, or other fat ſoils, from the neighbouring grounds, it then acquires a greater degree of coheſion, hardens when dry, and reſembles the cleanſing of ponds, more than the former.

The moſt conſiderable ſoil of this kind is the ſort called peat. This is uſually full of roots of weeds, and even of trunks and branches of trees and other plants. It always contains a bituminous oil, which renders it very inflammable when dry; at which time it alſo becomes very hard, though it is quite ſoft when in the mine, if we may be allowed to give that name to the bed in which it lies; for there it is eaſily cut in the form of bricks, as we ſee it when uſed for fuel.

"The whole maſs and body of this ſoil, ſays Mr. Maxwell, is a dung-hill, made up of rotten timber, graſs, weeds, and often mud waſhed from the higher grounds about it, by the land-floods; than which they are few richer compoſts: only by age, and its cold ſituation in water, pent in about it by the neighbouring riſing grounds, its ſalts are weakened, and its ſpirits become languid. The ſame will happen to the richeſt dung-hill that can be made of any compoſition whatever, if too long kept. It will even become ſuch as not to be diſtinguiſhed, by the eye, from ordinary moſs; nor will it be more uſeful, as dung, except either in proportion to the ſhorter time it has been kept, or the better ſituation of the place where it has ſtood. I believe the qualities of moſſy grounds differ very little from one another in any other reſpect, than with regard to the better or worſe quality of the mud which makes a part of their compoſition. They are more or leſs ſpungy, in proportion as this rich mud fills up the cavities of the component vegetables, which are preſerved from putrefaction by the acid in the water. The leſs ſpungy, and the more rotten the moſs is, the fitter it is for the vegetation of any thing planted in, or ſown on it."

The firſt thing to be done, in order to the improvement of moors, is to divide them into proper incloſures; not only to ſecure their future produce, but alſo to be a means of procuring rich earth to cover the otherwiſe inſipid uſeleſs mould on the ſurface, and give root to the plants which

which may afterwards be cultivated in them. Then, as the natural produce of this earth is of no value, its ſurface ſhould be pared off, in order to be burnt. But as this ſubject, of burning earth, has been before fully treated of, we ſhall only obſerve here, that the huſbandman ſhould be very careful not to make the clods too dry, or light his fires in too dry a ſeaſon, leſt they ſhould extend farther and deeper than was intended.

If the depth of the mooriſh earth be not very conſiderable, the ſurrounding ditches, which make the incloſure, will afford a rich ſtrong ſoil, which ſhould be ſpread about three or four inches thick all over the ſurface. When the clods are burnt, their aſhes ſhould be mixed with this new ſoil. If no proper earth can be got from the ditches, ſand or gravel may be uſed with ſucceſs, as was practiſed by the ancients. Gravel is ſingularly beneficial to ſuch lands, as has been ſhewn under the article BOG.

The Berne Society, who recommended this method of improvement as founded on repeated experience, very properly obſerve, that the good effects of the ſand and gravel will be conſiderably increaſed by a moderate mixture of dung, and that, eſpecially if the ground be intended for plowing, this covering ſhould be at leaſt a hand's breadth in thickneſs. Dung alone would undoubtedly be extremely efficacious on all ſuch ſoils, in which it is remarked to be of longer ſervice than in any other; but the farmer can ſeldom ſpare a ſufficient quantity of it to go far enough unmixed, nor indeed for mixing. In this caſe, other ingredients muſt be recurred to; though the ſand, or gravel, will generally do great things without any mixture. Well preſerved aſhes will be of excellent ſervice, and ſo will the rubbiſh of old buildings, or any other ſimilar ſubſtance, when mixed with the ſand or gravel, even of the coarſer kind, and incorporated with this naturally rich earth, which, were its real value known, and the proper method of treating it rightly underſtood, might claim a preference before any other ſoil. Loam is ſtill better than either ſand or gravel. This ſhould be brought on before the fires are lighted to burn the ſurface of the moſs, and ſhould remain in heaps till it can be equally mixed with the aſhes. Lime, where it can be had, will alſo contribute to the meliorating of moſſy grounds. The mooriſh earth, thus covered, is fitted for various kinds of crops.

Mr. King, who obſerved that the places in bogs in Ireland, where a little earth had chanced to fall as the peaſants were carrying it to mend the ways acroſs them, became a green ſod, covered with a fine ſcutch graſs, does not doubt but that the ſame expence as ſands or gravels land, would bring a dried bog even to be arable; and as to the common opinion that gravelling is bad for graſs, the contrary, he ſays, is apparent; eſpecially in bogs. Another method of reducing barren boggy land, in Ireland, is by laying upon it a little dung or ſtraw, and covering this with ſhells.

A ſtrong proof of the propriety of covering moſs with earth, reſults from a fact which happened to Mr. Græme, near Stirling. Two years after this gentleman had earthed his moſs, which he had not yet ſowed, it was as full of natural white clover, and other graſs, as any field generally is in twice that time.

In the province of Groninguen, they pare off the upper ſurface of the ſoil, which is a light looſe earth, and lay it by till they have dug out the peat underneath, when they mix it with the ſand which lies under the peat, and ſow it with rye and hay-ſeed the firſt year; after which they let it run to graſs, and have amazingly fine crops. In Sweden, a drained bog was remarkably improved by a peaſant who burnt upon it a parcel of uſeleſs wood and limeſtones; and another converted his drained bog into a fine meadow, by covering it with lime and tanner's bark.

Mr. Elliot, after draining a very remarkable ſwamp, ſowed it with graſs-ſeed, ſuch as red clover, ſpear-graſs, fowl-meadow graſs, and herd-graſs; none of which came up ſo well as the red clover, which he found to be the boldeſt and moſt hardy. Though this came up well, yet, where the ſward was ſtrong, what with the toughneſs of the ground, and the over-topping growth of the wild natural graſs, it made but ſlow progreſs till the fall of the year, and then it mended conſiderably. The other ſorts of graſs came up but poorly, the land being, as Mr. Elliot judges, too new and tough for them. In September, he ploughed up a piece of this ground, where he had not ſowed any graſs. It ploughed very tough, and the cattle mired in ſome places; but he kept them as much as poſſible upon the graſs; notwithſtanding which there was a neceſſity of leaving many baulks. About a month after, he ordered theſe baulks, to be hoed up, and was agreeably ſurpriſed to find how eaſily this was done. He found the meadow rotted and mellowed more in one month in the fall, than it had been in the whole ſummer; but thinks the ploughing would have been performed with much greater eaſe, if it had been deferred till a month later. In July, he ſowed a little piece with turnips, which came up, but did not grow well till the ground began to rot in the fall of the year, when they throve perfectly, and were good and ſweet, inſtead of being rank, as he expected.

This gentleman found by experience, that ſuch drained land muſt have one ſummer to ferment and rot, ſo as to become proper ſoil, before it will be fit for grain or every ſort of graſs. "If, ſays he, I had ſowed red clover inſtead of the other ſorts of graſs, I had ſaved five pounds in ſeed. Clover out-did my expectation, and the other ſorts fell ſhort of it. If others ſave where I loſt, and mend wherein I was miſtaken, it anſwers my deſign in writing.

"By a little experience which we have had of theſe drained lands, we find they will produce Indian corn, ſixty or ſeventy buſhels to an acre, and flax. If life and health be continued, I deſign to try liquorice-roots, barley, Cape-Breton wheat, cotton, indigo-ſeed, wood for dying, and the water melon. But what I have principally in view is hemp. New-England doth not, I ſuppoſe, expend leſs than ſeveral hundred thouſand pounds worth of foreign hemp yearly. If we can raiſe more than to ſupply our own occaſions we may ſend it home. It is not a mere conjecture, that the drained lands will produce hemp. I am informed by my worthy friend Benjamin Franklin, Eſq; of Philadelphia, that they raiſe hemp there upon their drained lands.

"Hemp requires ſuch very ſtrong land to produce it, that it would conſume all our dung to raiſe it in any great quantities; ſo that we ſhould not be able to raiſe bread-corn: therefore, how inviting ſoever the trade is, and how great ſoever the encouragements have been, both from home and by our own government, we have not as yet engaged in that affair. We have now a promiſing proſpect of ſucceſs in theſe drained lands: what may be the iſſue, time and experience muſt determine. A meadow of drained land, which could be laid under wa-

ter, and this drawn off at pleaſure, would probably be of great value. I have heard that a man in the Jerſies hath ſuch a meadow, which though only half an acre in extent, yields him as much hemp yearly, as ſells for fifty pounds, York money: but this ſeems incredible."

Whatever advantages are reaped from hemp, may alſo be received from flax, if rightly managed, upon moſſy grounds. Some improvers in Scotland have already tried it with ſucceſs, and though, a new attempt, doubt not its anſwering well in that kind of ſoil. The moſt approved method of cultivating and dreſſing each of theſe ſingularly beneficial plants, are given under the articles HEMP and FLAX.

"It is common in ſwamps, continues Mr. Elliot, to find the moſs two or three feet deep. At firſt, I was perplexed how to get rid of it, and ſomewhat doubtful whether the land would be worth any thing, if this ſurface was removed. When the water was drawn off by ditches, the moſs grew ſo dry, that in a hot ſummer ſeaſon, it would burn quite down to the ground. To burn this, or any other traſh you would conſume upon land, ſet fire to it when the weather is clear, the ſun hot, and a ſtrong ſoutherly wind blows, which makes fire rage more fiercely and do much more execution, than a northerly or weſterly, wind. In a northerly wind the air is thin and light, ſo that the fire is not ſtrongly compreſſed: the moiſt heavy ſouth wind prevents the diſſipation of the fire, and renders it more compact. Thus we ſee a ſmith ſwab and wet his coals, by which means the heat is greatly increaſed. Whether this reaſoning be juſt or not, the fact is certain, and that is the chief concern of the farmer.

"Deep ſwamps are preferable to thoſe which are ſhallow: for experience ſhews, that a deep ſoil bears extreme drought better than any other land, in the hot ſeaſon. The cold drought in the ſpring will hurt ſuch land, ſo that the firſt crop of graſs will be very great; but the ſecond crop will be extraordinary good.

"The red clover in my drained land above-mentioned, looked in the cold drought at the latter end of the ſpring, as if it would not come to any thing: but it recovered a good colour, and grew up well, when hot weather came on, though the drought continued. This is ſuch an advantage as will always recommend a ſoil eight or ten feet deep.

"Our ditching and draining dry only the top of the ground, not more than three feet deep in the hot and dry ſeaſon; I ſuppoſe that the moiſture from the mud and water underneath is drawn by the force of the ſun, ſo that the roots of the graſs are furniſhed with ſufficient moiſture to bring forward the vaſt burden they frequently bear. But this is not to be expected till the land be concocted, changed, and altered by the ſun and air: for at firſt, ſoon after it is drained, it is pinched with the drought more than any other land.

"Thoſe ſwamps which are thick overgrown with moſs, prove as good as any other drained land, when they are ſo far dried by draining, that the moſs will rot, or burn off. I mention this, becauſe it is beſt that the farmer work as free from diſcouragement as poſſible.

"Our drained land, though in all other reſpects well adapted for producing Indian corn, is of ſo looſe a texture, that the plants become an eaſy prey to crows and other birds, which, if not prevented, will pull up a great part of them, and deſtroy the crop. To guard againſt this great diſcouragement in all ſuch land,

"Take the roots of ſwamp hellebore (known in different places by the ſeveral names of ſkunk-cabbage, tickle-weed, bear-root) and boil them in ſo much water as to keep them covered an inch deep: by two hours boiling, the liquor will be of ſufficient ſtrength: ſtrain it off; put your corn into it while the liquor is warm, and let it ſteep twenty hours. It will then be fit for planting.

"This is found to be an effectual ſecurity. The Rev. Mr. Todd obſerves, that after meeting with much trouble and loſs, by having his corn repeatedly pulled up, he planted his ground with corn ſteeped in this liquor; but not having enough of that, he ordered the planting to be finiſhed with unſteeped corn. The event was, that the birds pulled up but two or three hills of the ſoaked corn, but left not one in ten of thoſe which were planted with unſoaked corn. He planted anew, with ſteeped corn, the hills where the plants had been thus pulled up, except a few of them in the middle of the field, which were planted a ſecond time with unſteeped corn, upon a ſuppoſition that the birds would not find them out: but the reſult was as before: all the unſoaked was pulled up, and the hills planted with the ſteeped corn were ſpared.

"Upon the whole," ſays Mr. Todd, "I think this experiment a full proof that corn ſo prepared when planted, is ſecured from the birds; the knowledge of which may be of great ſervice to huſbandmen, as the preparation is cheap and eaſy, and our ſwamps ſeem to be the beſt land we have for Indian corn. My little ſwamp this year yielded after the rate of above ninety buſhels to the acre, and was eaſier and cheaper tilled than the ſame quantity of upland." *See the article* BOG.

MORES, or *Mours*, hills.

MORGAN, the ſame with May-weed. *See the article* MAY-WEED.

MOSS, a name given to moory or boggy grounds, in many parts of England. Theſe ſorts of land conſiſt of a turfy ſurface, below which is a black, moiſt, ſpongy, earth, which being dug up with ſpades, almoſt in the form of bricks, and dried, is what they call peat, and uſed as fuel in ſeveral parts.

The ſhorteſt method of all for the improvement of moſs, if the ground be deſigned only for graſs, and its ſituation be ſuch as admits of it, is this: firſt drain the moſs, and if there be heath upon it, burn that off, and make the ſurface even. Then make a dam at the loweſt part, and a ſluice, and work the water upon it through the winter. The mud which comes with the land flood will bring a fine ſward upon it in two or three years, and be afterwards a yearly manure; ſo that it will bear annual cutting, and, beſides, be good paſture for cattle, after the ſward is become ſtrong enough to bear them.

Mr. Græme found that the improvement of moſs may be endangered by draining it too much; for his crops were beſt where the ſurface of the water in the ſurrounding ditches was not above three feet lower than the level of the moſs. It will, undoubtedly, be a vaſt advantage to an improved moſs, if the farmer is able to flood it at proper times, by means of a ſluice in the loweſt part of the ſurrounding ditch, as mentioned before. This will greatly promote the growth of plants; but ſhould be uſed with the caution of not letting the water remain too long at a time upon the ground, becauſe, though there will be no

no danger of its re-converting the ſoil into a bog ſo long as there are channels to carry it off, it will be apt to chill, and thereby hurt the plants. *See the article* BOG, *and* MOOR.

Moss *on Trees*, is a diſtemper of very bad conſequence to their increaſe, and much damages the fruit of the trees of our orchards.

The preſent remedy is the ſcraping it off from the body and large branches, by means of a kind of wooden knife, that will not hurt the bark; or with a piece of rough hair-cloth, which does very well after a ſoaking rain. But the moſt effectual cure is, the taking away the cauſe. This is to be done by draining off all the ſuperfluous moiſture from about the roots of the trees, and may be greatly guarded againſt in the firſt planting of the trees, by not ſetting them too deep.

If trees ſtand too thick in a cold ground, they will always be covered with moſs; and the beſt way to remedy the fault is to thin them. When the young branches of trees are covered with a long and ſhaggy moſs, it will utterly ruin them; and there is no way to prevent it, but to cut off the branches near the trunk, and even to take off the head of the tree, if neceſſary, for it will ſprout again; and if the cauſe be in the mean time removed by thinning the plantation, or draining the land, the young ſhoots will continue clear after this.

If the trees are covered with moſs, in conſequence of the ground's being too dry, as this will happen from either extreme in the ſoil, then the proper remedy is, the laying mud from the bottom of a pond or river, pretty thick about the root, opening the ground to ſome diſtance and depth to let it in; this will not only cool it, and prevent its giving growth to any great quantity of moſs, but it will alſo prevent the other great miſchief which fruit-trees are liable to in dry grounds, which is, the falling off of the fruit too early. *Mortimer's Huſbandry.*

Falſe MOTH, an inſect which proceeds from a ſmall caterpillar, the body of which is ſmooth and whitiſh. It has ſixteen legs, does not lodge in the grains of corn, but contrives to faſten ſeveral of them together with a web which it ſpins, and with which it makes itſelf a dwelling place like that of common caterpillars. This dwelling place, or ſheath, in which the caterpillar of the falſe moth uſually abides, is generally in the middle of the little heap of grains which it has collected for its food: but, which diſtinguiſhes it from the caterpillar of the true moth, it can quit this ſheath at any time, to eat the grains around it, one after another. It generally attacks ſeveral grains at once, and always without order, eating ſometimes of one, and ſometimes of another; ſo that ſeveral are gnawn, when not one is wholly conſumed. When theſe inſects are very numerous in a granary, all the grains upon the ſurface of the corn are linked together by a web, ſo as to form a cruſt, which is ſometimes three inches thick. This caterpillar turns into a chryſalis, or aurelia, in a grain which it has hollowed, or in the ſheath of its web, and iſſues from thence, in the month of June, in the form of a butterfly. When a heap of corn is ſtirred in which there are many caterpillars of the ſpecies of this falſe moth, thoſe inſects crawl up the walls; but they ſoon return to the heap, and, by the very next day, cover it all over with a new web.

In its ſtate of moth, it is grey, has ſix legs, and is frequently ſeen in vaſt numbers fluttering about the eaves of the windows of granaries, in the ſpring and ſummer, when the weather is very hot. The females lay their eggs upon the heaps of wheat, and theſe eggs produce the caterpillars, or corn worms, as ſome call them, which feed on the grain, and invelop it with their ſilky web, ſo as to form over the whole ſurface a cruſt that is ſometimes three or four inches thick. This entirely ſpoils the corn within that depth, beſides communicating a bad ſmell to all the reſt. Theſe worms, or rather caterpillars, for they have ſixteen legs, are ſmooth, whitiſh, and ſeldom exceed a quarter, or at moſt the third part of an inch, when at their full growth. Breaking of their webs avail but little, for they are woven again by the next day: for which reaſon ſome have been of opinion, that it is beſt to let them enjoy undiſturbed the ſurface of the corn of which they have taken poſſeſſion. But it ſhould be conſidered, that three inches are a ſixth part, and four inches upwards of a fifth, of any quantity of corn ſpread eighteen inches deep, which is the medium thickneſs at which it is laid; and that, independant of the bad ſmell with which the reſt is tainted, this is a very conſiderable object, though it extend no farther. When this cruſt is broken, moſt of the grains which compoſe it are found to be either gnawn in their inſide, or full of live worms, or of aureliæ, according to the ſeaſon; or one ſees only the empty ſheaths of the caterpillars, if the aureliæ have been transformed into moths.

It is ſaid, that ſtrewing the corn with powdered lime, ſo as to form a cruſt over it, will preſerve it from the ravages of theſe inſects: but as the ſurface would ſtill be ſpoiled, and as that ſurface may be a conſiderable part of the ſmall proviſion of wheat allotted for a family only, M. Duhamel did not try this expedient. Covering it with hay, which he did try, anſwered no end whatever.

Theſe obſervations, and the reflections conſequent thereon, made him ſuſpect that this inſect, as it delights in none but very warm places, would not be able to live in the cold air of his ventilating granaries.

Accordingly, in the winter of the year 1746, he collected all the wormy cruſts which theſe caterpillars had formed in his common granaries, where they were very thick, the moths having been extremely numerous the preceding ſummer. Theſe cruſts were broken and ſcreened; and what grain could be got from them, which undoubtedly was impregnated with the eggs of the moths, was put into one of his granaries of preſervation, which contained ſeventy-five cubic feet, and was ventilated from time to time during all the winter.

Towards the end of May, when the vent-holes at the top of this granary were opened, a prodigious number of moths flew out, which ſhewed that they did not like their ſituation.

When the wheat was thought to have been ventilated ſufficiently, the holes were ſhut cloſe, and nothing more was done to it for a month: for as this corn (which had not been ſtove dried) was old and dry enough, it was but ſeldom ventilated.

In June 1747, this granary was emptied: all the moths and worms were dead, and there remained only a thin cruſt, not above the twelfth part of an inch thick, on the top of the corn, which had ſo far loſt the bad ſmell it had when put into the granary, that it ſold for the current market price.

Not ſatisfied with this ſingle method, M. Duhamel tried the effect of the ſtove upon another parcel of wheat known

known to be full of these worms. A heat from 45 to 50 degrees of Réaumur's thermometer (from 115 to 124 of Farenheit's) killed them all. This corn was then laid up in a common granary, where it remained two years without being attacked by any of these moths; and even in the third, but very few of them appeared.

These experiments remove all doubt of the possibility of destroying the corn moth, or worm, without hurting the grain, which would otherwise be spoiled by it; and as that grain, generally is wheat, which the insect prefers to any other, this discovery is of great importance to the husbandman, as well as to the public.

MOULD, a loose kind of earth, every where obvious on the surface of the ground, called by some mother earth, and by others loam.

The goodness of a mould for the purposes of agriculture and gardening, &c. may be known, according to Mr. Miller, by the sight, smell, and touch. 1. Those moulds that are of a bright chesnut or hazely colour, are counted the best: of this colour are the best loams, and also the best natural earth; and this will be the better yet, if it cut like butter, and does not stick obstinately, but is short, tolerably light, breaking into small clods, is sweet, will be tempered without crusting or chopping in dry weather, or turning to mortar in wet. Next to that the dark grey and russet moulds are accounted the best: but the light and dark ash coloured the worst, such as is usually found on common heathy ground: the clear tawney is by no means to be approved; but that of the yellowish red colour is the worst of all: this is commonly found in wild and waste parts of the country, and for the most part produces nothing but gos, furze, and fern, according as their bottoms are more or less of a light and sandy, or of a spewey gravel, or clayey nature. 2. All lands that are good and wholesome, will, after rain, or breaking up by the spade, emit a good smell. 3. By the touch we may discover whether it consists of substances entirely erenaceous, or clammy; or, as it is expressed by Mr. Evelyn, whether it be tender, fatty, detersive, or slippery; or more harsh, gritty, porous, or friable.

MOULDINESS, a term applied to bodies which corrupt in the air, from some hidden principle of humidity therein; and whose corruption shews itself by a certain white down, or lanugo, on their surface, which, viewed through a microscope, appears like a kind of meadow, out of which arises herbs and flowers, some only in the bud, others full blown, and others decayed, each having its root, stalk, and other parts.

MOUND, a bank or fence of earth. *See the article* BANK.

MOW, the pile or collection of corn in the straw, placed in a bay of a barn. *See the article* BARN.

MOW-BURNT, over-heated in the mow for want of being dry.

MOWING, the art of cutting down corn, gras, &c. with a scythe.

M. de L'Isle lately introduced the mowing of wheat. The method is this: the scythe he uses is at least six inches shorter in the blade than the common scythe, and instead of a cradle has two twigs of ozier put semicircular wise into holes made in the handle of the scythe, near the blade, in such a manner, that one semicircle intersects the other: this method is frequently practised by the men who mow our meadows, as they think a cradle unnecessary and cumbersome, unless the scythe is to carry over a very large and very heavy swarth.

In mowing barley, or oats, the corn is always on the right-hand of the workman: but by M. de D'Isle's method of mowing wheat the corn is at his left-hand: he mows it inward, bearing the corn he cuts on his scythe, till it comes to that which is standing, against which it gently leans. After every mower follows a gatherer, which may be a lad of twelve or fourteen years of age, or a woman. The gatherer keeps within five or six feet of the mower, and being provided either with a hook or stick about two feet long, gathers up the corn, makes it into a gavel, and lays it gently on the ground: this must be done with spirit, as another mower immediately follows; for to every mower there is a particular gatherer.

To do this work properly, the mower should form but one track with his feet, advancing in a posture nearly as if he was going to fence, one foot chasing the other. In this manner the standing corn is mowed; but the workman must take care to have the wind at his left, as it bears the corn towards the scythe, and causes it to be cut nearer the ground. If the wind is behind the mower, it is no great inconvenience: it only occasions the scattering of a few ears; and the cut of corn, which should lean against the standing corn, is sometimes thrown down; which makes the work go on slower, and encrease the gleanings. The wind in front is very bad; the corn cannot be cut close, and there is a great loss: but the wind on the right-hand is worst of all; the stubble is left long, and such a quantity of gleanings, that one would imagine no crop had been taken off. When wheat is bent, the workman takes the corn as it presents itself to him, which has the same effect as if the wind was at his left-side. When wheat is laid, it is more troublesome to the gatherer, because the cut corn is apt to be mixed with that which is standing; but a good mower takes the advantage of the wind, and cuts it against the way it is laid. No particular directions can be given for corn that is lodged and tangled, unless it is to take it as it is inclined, as if the wind was in the back of the mower.

This method of mowing of wheat was tried in Northamptonshire, and the following account of it sent to the editors of the Museum Rusticum.

"A gentleman, a foreigner, says this writer, came down here to a neighbour's of mine, in order to put us into a method of going about this work.

"Many trials were made in the presence of myself, and a great number of others: the scythes did their work well; they cut the corn within two inches of the ground; and though our workmen were of course a little awkward, scarcely any ears were scattered; but the greatest advantage is, that a man with one of these scythes can cut down at least double the quantity of wheat in the day he can with a sickle or hook.

"The chief objections made to the introduction of this method were, that the stubble is left too short, and on that account is not fit for thatching; that the weeds are cut with the corn, and will be apt to mould or heat, and the seeds to mix with the corn in threshing; and that the poor are deprived of their gleanings, as none of the corn is scattered.

"But these objections must soon fall to the ground, when we reflect that, by mowing, the straw is much longer, and certainly straw is much better for thatching than stubble.

"As to the weeds being cut with the corn, it is of no conse-

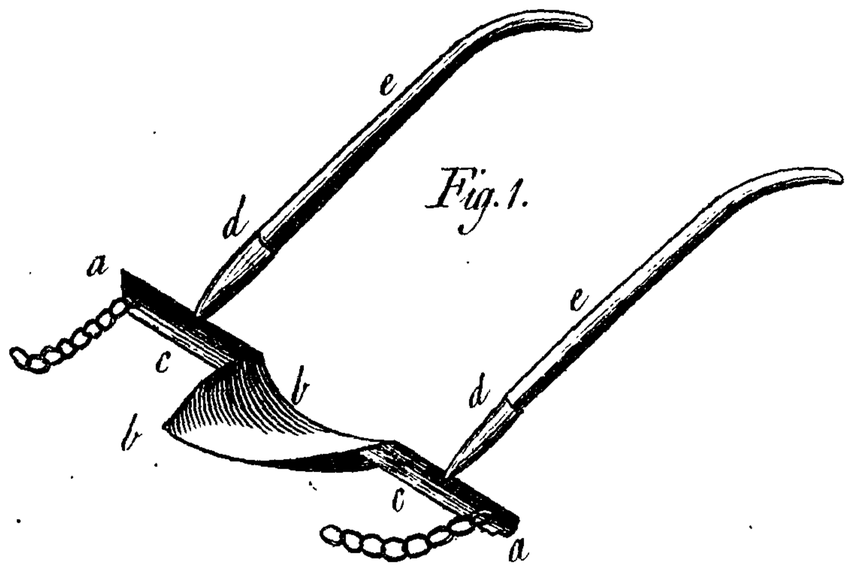


Fig. 1.

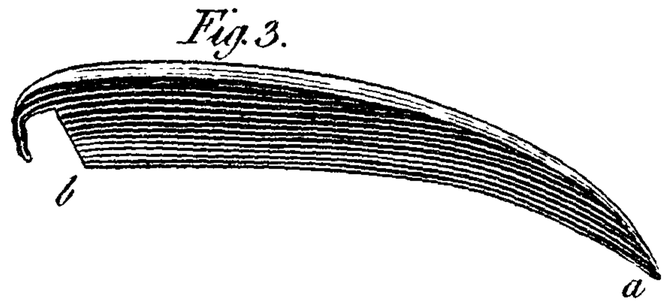


Fig. 3.

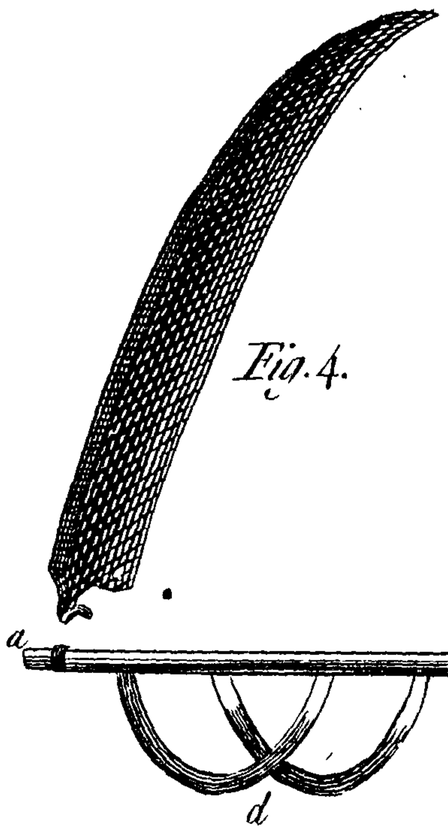


Fig. 4.

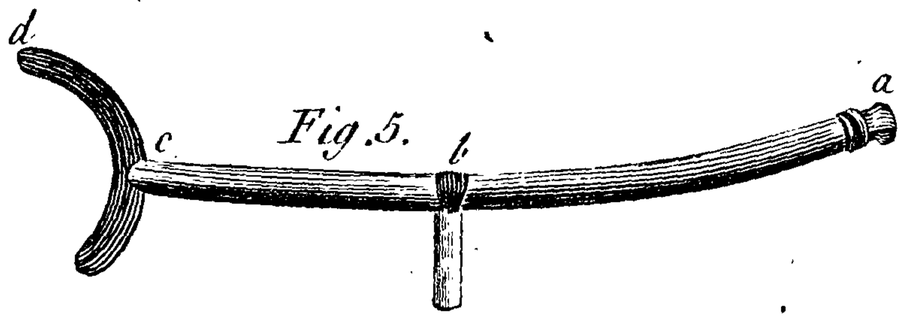


Fig. 5.

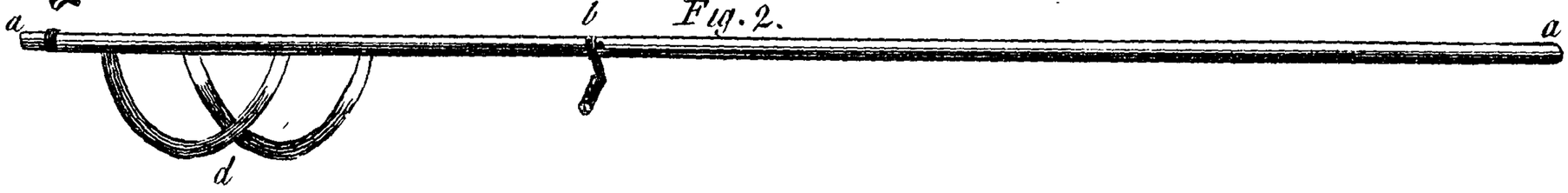


Fig. 2.

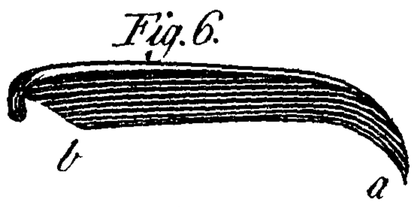


Fig. 6.

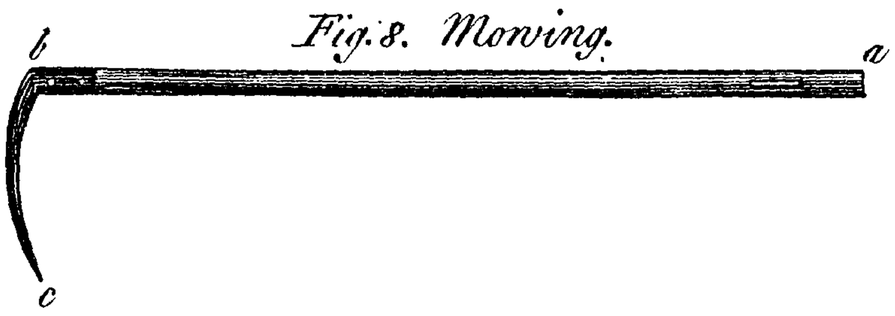


Fig. 8. Mowing.

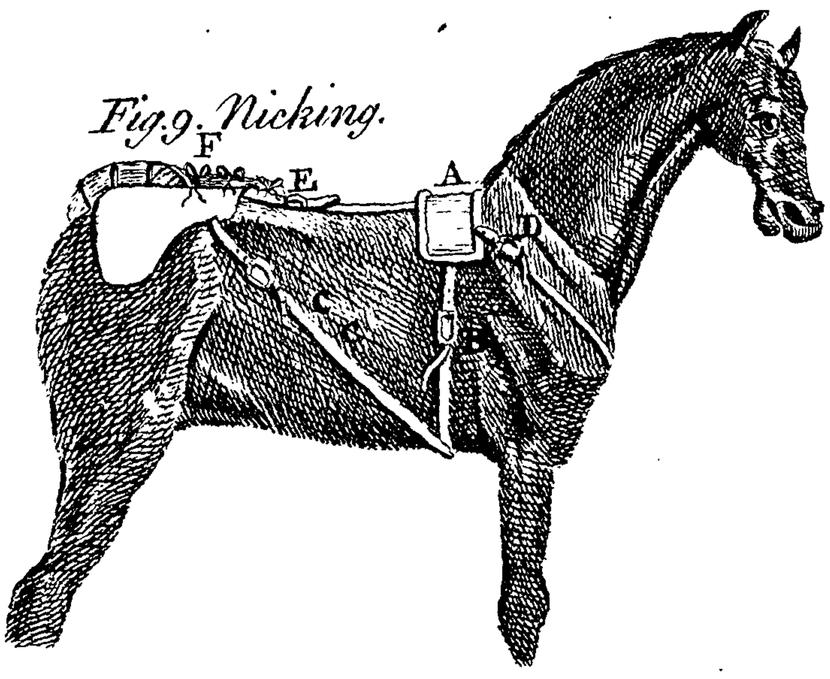


Fig. 9. Nicking.

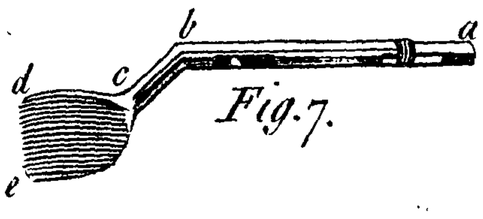


Fig. 7.

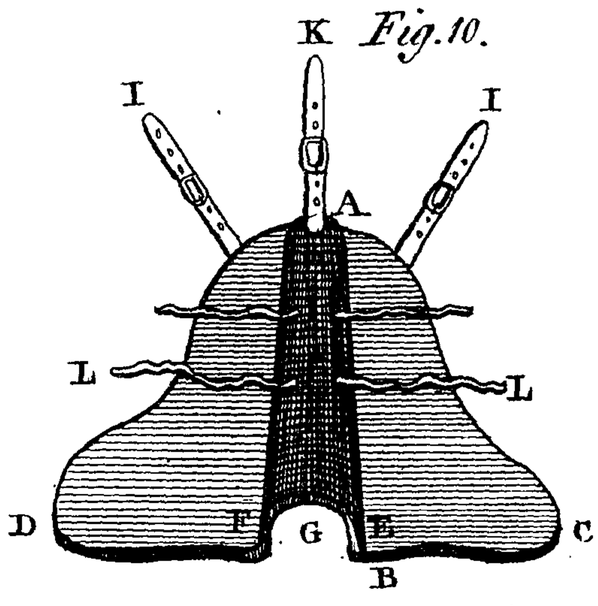


Fig. 10.



Fig. 11.

conſequence; for they are eaſily ſhaken out of the bottoms of the ſheaves, after drying a day or two; and the ſheaves may be ſafely left to dry, if they are laid in the following manner.

"Suppoſe three tobacco pipes to repreſent three ſheaves, the bowls to be the feet of the ſheaves, and the ſmall part the ears: lay one of theſe on the ground; then take another, and lay the bowl of it under the ſmall end of the firſt; take afterwards a third, and diſpoſing them in form of a triangle, lay the bowl of the third under the ſmall end of the ſecond, and the bowl of the firſt under the ſmall end of the third; by diſpoſing them in this form, the ears are always kept from the ground, and will endure a great deal of wet without damage.

"As to the ſeeds of the weeds being threſhed, and mixing with the corn, they may eaſily be avoided; for the wheat, by this method of mowing it, is ſo regularly diſpoſed in the ſheaf, that the ſheaves need only be threſhed on the ear, without being unbound.

"The objection that the poor would be deprived of their gleaning, is a mere farce: their time might be much better employed; and by the ſame parity of reaſon, the more corn the farmer left for them in the field, the more juſtice he would do them; and this few would venture to aſſert, as cuſtom might in time extend it to half the crop: beſides, as by this new method, a great deal more corn will be inned, it will of courſe be cheaper the year round, and eaſier purchaſed by the poor.

"The foreign gentleman was of great uſe to us; he is intelligent and communicative, and we all of us acknowledge ourſelves much obliged to him.

"Many in this county propoſe making more extenſive trials of it next harveſt, and there is no doubt but that in the ſpace of a few years it will be brought into conſtant uſe.

"A ſhort certificate of the advantages reſulting from the practice of this method, was ſome time ago drawn up; it was preſently ſigned by a number of gentlemen, farmers, gardeners, labourers, &c. and tranſmitted to Dr. Templeman, ſecretary to the Society of Arts in London, to be, if neceſſary, publiſhed for the benefit of the kingdom. This new method will doubtleſs be introduced to the knowledge of the Engliſh world with a better grace, coming under the ſanction and recommendation of ſo reſpectable and uſeful a Society."

The authors are happy, that, as members of the ſociety, they have an opportunity of conveying to the readers of this Dictionary a perfect idea of the form of the ſcythes lately tried in Northamptonſhire; for this purpoſe they have annexed a plate engraved from a drawing taken from the three ſcythes now depoſited in the Society's machine-room, for the inſpection of the curious. The parts are repreſented ſeparate, that they might be more diſtinct: the dimenſions and proportions follow. Plate XX. Fig. 7. is the handle, or mounting of the largeſt ſcythe; the length of it from *a* to *c* is eight feet, from *a* to *b* five feet, from *b* to *c* three feet; at *c* is the part whereon the blade is fixed, *d* ſhews the two bends which ſerve inſtead of a cradle. Fig. 3, is the blade to this ſcythe; from the heel *a*, to the point *b*, meaſures three feet, and it is two inches and a half broad; when the ſcythe is mounted, from the point to the blade *b*, to the end of the long handle *a*, meaſures an angle of ſeven feet. Fig. 4. is the blade of an other ſcythe, the length and breadth the ſame as the laſt blade. Fig. 5. is the handle to this ſecond ſcythe; from *a* to *d*, it meaſures three feet ten inches, from *a* to *b*, two feet, and from *b* to *c*, one foot ſeven inches; the blade is fixed at *a*, and when the ſcythe is mounted, the angle from the point of the ſcythe-blade to the end of the handle, meaſures three feet nine inches. Fig. 6. is the blade of the ſmalleſt ſcythe; from *a* to *b*, it meaſures one foot nine inches, and is two inches and an half broad. Fig. 7. is the handle or mounting to this laſt ſcythe; at *a* the blade is fixed; from *a* to *b*, is one foot five inches and an half; the angle from *b* to *c*, four inches and an half; from *c* to *d*, five inches; from *d* to *e*, three inches and three quarters. Fig. 8. is the gathering hook; the length of its handle, from *a* to *b*, is three feet nine inches; the hook from *b* to *c*, is ten inches long.

MUCK, dung, or ſtraw that lies rotting.

MUD, the ſediment at the bottom of rivers, ponds, ditches, &c. *See the article* DUNG.

MUGWORTH, a very troubleſome weed; for its roots creep far under the ſurface of the ground, ſo as ſoon to overſpread a large ſpace, if they are not ſtopped; and its ſeeds, being light, and eſily carried to a diſtance by the wind, will produce numbers of new plants the next ſpring. It has plain cut leaves, ending in many parts, woolly underneath, and ſingle ſpikes of pale yellow oval flowers, which blow in June.

MULBERRY, the name of a tree, of which there are ſeveral ſpecies, but two only are generally cultivated, called the black and white mulberry.

The black mulberry grows naturally in Perſia, from whence it was firſt brought to the ſouthern parts of Europe; but is now become common in every part of Europe, where the winters are not very ſevere: for in the northern parts of Sweden, theſe trees will not live in the open air; and in ſeveral parts of Germany they are planted againſt walls, and treated in the ſame way as peach and other tender fruits are here.

Theſe trees are generally of both ſexes, having male flowers or katkins, on the ſame tree with the fruit; but it often happens, that ſome of the trees which are raiſed from ſeeds, have only male flowers, and produce no fruit; ſo that thoſe who plant theſe trees for their fruit, ſhould never make choice of ſuch as have been propagated by ſeeds, unleſs they have ſeen them produce fruit in the nurſery. It is alſo the ſureſt way to mark ſuch trees as are fruitful in the nurſery at the time when their fruit is upon them, becauſe thoſe trees which are propagated by layers, are ſometimes of the male ſort.

The old mulberry trees are not only more fruitful than the young, but their fruit are much larger and better flavoured; ſo that where there are any of theſe old trees, it is the beſt way to propagate from them, and to make choice of thoſe branches which are moſt fruitful. The uſual method of propagating theſe trees, is by laying down their branches, which will take root in one year, and are then ſeparated from the old trees; but as the moſt fruitful branches are often ſo far from the ground as not to be layed, unleſs by raiſing of boxes or baſkets of earth upon ſupports for this purpoſe; ſo the better way is to propagate them by cuttings, which if rightly choſen and ſkilfully managed, will take root very well; and in this method there will be no difficulty in having them from trees at a diſtance, and from the moſt fruitful branches. Theſe cuttings ſhould be the ſhoots of the former year, with one joint of the two years wood to

their bottom; the cuttings ſhould not be ſhortened, but planted their full length, leaving two or three buds above ground. The beſt ſeaſon for planting them is in March, after the danger of hard froſt is over; they ſhould be planted in light rich earth, preſſing the ground pretty cloſe about them; and if they are covered with glaſſes, it will forward their putting out roots; but where there is no ſuch conveniency, the ground about them ſhould be covered with moſs, to prevent its drying; and where this is carefully done, the cutting will require but little water, and will ſucceed much better than with having much wet. If the cuttings ſucceed well, and make good ſhoots, they may be tranſplanted the following ſpring into a nurſery, where they ſhould be regularly trained to ſtems, by fixing down ſtakes to each, to which the principal ſhoots ſhould be faſtened; and moſt of the lateral branches ſhould be cloſely pruned off, leaving only two or three of the weakeſt to detain the ſap, for the augmentation of the ſtem; for when they were quite diveſted of the ſide ſhoots, the ſap is mounted to the top, ſo that the heads of the trees grow too faſt for the ſtems, and become too weighty for their ſupport. In about four years growth in the nurſery, they will be fit to tranſplant where they are to remain; for theſe trees are tranſplanted with greater ſafety while young, than when they are of a large ſize.

The white mulberry is commonly cultivated for its leaves to feed ſilk-worms, in France, Italy, &c. though the Perſians always make uſe of the common black mulberry for that purpoſe; and it is ſaid that the worms fed with thoſe of the black produce much better ſilk than thoſe fed with the white; but it is to be obſerved, that the leaves of the black ſort ſhould never be given to the worms, after they have eaten for ſome time of the white, leſt the worms ſhould burſt, which is often the caſe when they are thus treated.

The trees which are deſigned to feed ſilk-worms ſhould never be ſuffered to grow tall, but rather kept in a ſort of hedge; and inſtead of pulling off the leaves ſingly, they ſhould be ſheared off, together with their young branches, which is much ſooner done, and not ſo injurious to the tree.

This white ſort may be propagated either from the ſeeds or layers, as the black mulberry, and is equally hardy; but the moſt expeditious method of raiſing theſe trees in quantity, is from the ſeeds, which may be procured in plenty from the ſouth of France and Italy. The beſt way to ſow theſe ſeeds, in England, is to make a moderate hot bed, which ſhould be arched over with hoops, and covered with mats; upon this bed the ſeeds ſhould be ſown in the middle of March, and covered over with light earth about a quarter of an inch deep: in very dry weather, the bed muſt be frequently watered, and in the heat of the day ſhaded with mats, and alſo covered in the nights when they are cold. With this management the plants will come up in five or ſix weeks, and as they are tender when they firſt appear, ſo they muſt be guarded againſt froſty mornings, which often happen in May. During the ſummer they muſt be keep clean from weeds, which is all the culture they require: but there muſt be care taken of them the firſt winter, eſpecially to cover them in autumn, when the froſts come, which will kill the tender plants to the ground, if they are not protected; the following March, theſe plants ſhould be tranſplanted into the nurſury, to get ſtrength, where they may remain two or three years, and then ſhould be removed where they are to continue.

MULE, a mongrel kind of quadruped, uſually generated between an aſs and a mare, and ſometimes between a horſe and a ſhe-aſs.

The mule is a ſort of a monſter, of a middle nature between its parents, and therefore incapable of propagating its ſpecies; ſo careful is nature to avoid filling the worlds with monſters. Mules are chiefly uſed in countries where there are rocky and ſtony roads, as about the Alps, Pyrenees, &c. Great numbers of them are kept in theſe places; they are uſually black, ſtrong, well limbed, and large, being moſtly bred out of the fine Spaniſh mares.

In Spain there is great encouragement for breeding and training mules to every kind of buſineſs: in Portugal they are eſtimated at a high price, and are not a little valued in the ſouthern parts of France.

I own, ſays a writer in the Muſeum Ruſticum, I have often been aſtoniſhed (the uſeful nature of this creature conſidered) that we do not more encourage the breed in England. This inattention may perhaps proceed from mules being thought naturally more vicious than horſes: I doubt the fact; yet be it as it will, they are, to my knowledge, equally capable of being made uſeful, docile, and gentle.

I aſſert not this merely from opinion, having had many years experience of what may be done in this way.

During the courſe of the war, in which his royal highneſs the duke of Cumberland commanded the army of the allies in Flanders, the empreſs queen made him a preſent of above fifty fine mules to carry his baggage: theſe mules at the end of that war, were brought to England, at which time I had an opportunity of ſeeing and admiring them. They were, I think, the fineſt and largeſt I ever before beheld; and one, nearly white, particularly attracted my attention, being almoſt ſixteen hands high.

This circumſtance of ſeeing his highneſs's ſtring of mules, it was firſt induced me to think of breeding them, in which I have ſince had uncommon ſucceſs.

I had many encouragements to make the attempt: my fortune was ſuch as could not be hurt by the experiment; my park was extenſive, and very proper for the purpoſe; and I had many ſervants, who had ſo little to do, as to have leiſure time enough to obey my orders in this matter.

My great difficulty at firſt ſetting out was to procure a he aſs or two to cover my mares; for I found none were to be got of any ſize bred in England.

It is true, I met with ſome Spaniſh aſſes; but they were ſluggiſh, and not likely to get mettled colts: beſides, I could not buy two of them, of any ſize and ſhape, under ſeven hundred pounds, which I thought too much money to throw away, if I could by any other means get my end eaſily anſwered.

Senſible that perſeverance does much in all things, I bought a ſtrong-boned, fine-ſhaped he aſs, and two ſhe aſſes of a large ſize, conſidering they were bred in England, determined to try if I could not by a little care and attention mend the breed, before I attempted to get any mules.

Theſe coſt me only four pounds, and my two ſhe aſſes ſoon afterwards dropped a foal each.

I continued to breed from them ſeveral years; but it is the manner in which I managed the aſs colts, that the great

great ſucceſs I have lately had in breeding mules muſt be aſcribed.

I took care that the ſhe aſſes ſhould be well fed, and be kept in order, both before they dropped their foals, and afterwards whilſt they ſuckled.

As ſoon as the colts were weaned, I had them as carefully attended and fed as if they had been got by Childers or Babram: every winter they ſtood under cover, defended from the injuries of the weather, and were regularly fed, cleaned, and littered, the door of the ſtable being always left open two or three hours in the middle of the day, for them to exerciſe themſelves as they thought proper, which they ſeldom failed to do, if the weather was fine, to ſome purpoſe, returning, without compulſion, when the hour of feeding approached.

In this manner I always managed them till they were three years old, when I permitted my ſtone colts to cover, and my females to breed.

You would indeed be ſurpriſed to ſee how much, by this plain and ſimple management, my breed of aſſes is improved: for I have now in my ſtables ſeveral he aſſes, which I keep as ſtallions, that are, I believe, as large, and as well ſhaped, as any that were ever heretofore bred in theſe iſlands.

I ſhall now proceed to deſcribe to you the manner in which I breed my mules. For this purpoſe I chuſe mares that are of a very large breed, ſuch as are ſometimes uſed to draw the brewers drays in London.

My next care is that they are young, full of life, large barrelled, but ſmall limbed, with a moderate ſized head, and a good forehand. At the proper ſeaſon my mares are covered by my aſs ſtallions, and they ſeldom miſs. During the time the mares are in foal, I take care to have them fed with nouriſhing fodder, ſuch as I imagine will moſt contribute to the ſize of the foal.

My expectations, after this management, are generally anſwered, for in due ſeaſon my mares drop foals, which I could often ſell for ten, and ſometimes for twenty guineas a piece at three months old; and their future value is more than in proportion encreaſed afterwards.

I always houſe my mule colts the firſt winter; otherwiſe the hard froſts, and ſharp, cold, long nights, would ſtint them in their growth, beſides making them unſhapely and rough.

From the time of their being dropped, I cauſe them often to be handled, to make them gentle: this prevents their hurting themſelves by ſkittiſhneſs, and ſudden frights; they are beſides much eaſier broke at the proper age, and become docile and wonderfully harmleſs, having nothing of that viciouſneſs which is ſo commonly complained of in theſe animals.

I have them for the moſt part broke at three years old, but never permit them to do much work till four; they are thus ſecure from being hurt by hard labour, till they have acquired ſtrength enough to bear it without injury.

I have now ſeveral mules which I conſtantly employ in various kinds of labour; two, which are indeed very fine, I ride myſelf after my harriers; two more I keep for my huntſman, and one for my whipper-in: theſe are black, ſorrel, and grey.

I have alſo four fine mules, but ſtronger and heavier than thoſe above-mentioned, which I drive occaſionally in a four-wheel chaiſe, beſides ſeveral others leſs valuable, uſed for ploughing and carting.

Some of my neighbours ſmile at my taſte; yet they cannot at the ſame time help acknowledging, that they are cheaper animals, when bred at home, as has been my practice, than horſes.

Perhaps ſome of your readers, from the hints above thrown out, may be inclined to try the experiment: if ſo, I would caution them againſt ſome errors I at firſt ſetting out fell into.

I thought at firſt I could not keep my colts too well during the winter months: accordingly I ordered that they ſhould have the ſweeteſt hay, which I had before ordered to be reſerved for my cows, and as many oats as they could eat.

This way of feeding them, it is true, made them very fat; but it was far from being an advantage to them; for I afterwards found by experience, that it was not only incurring a much larger expence than was any ways neceſſary, but alſo made them wonderfully nice and delicate in their appetites ever after, and alſo by encreaſing their weight of fleſh, made them more ſubject to ſtrains and hurts in their morning gambols.

Finding this to be the caſe, I altered my method entirely, and contented myſelf with giving them food enough to prevent their loſing fleſh, and keep up their growth, without palling their appetites with delicacies, or making them over fat: as to the reſt, I took the ſame care of defending them from the injuries of the weather as ever, by allowing them ſtable room, and good litter to ſleep on, beſides cauſing them every day to be well rubbed down with a hard whiſp of ſtraw by an active groom, whoſe peculiar province it was to attend them; and this was ſcarcely ever omitted, particularly in cold, raw, wet weather, when they were leaſt inclined to exerciſe themſelves in the park. *Muſeum Ruſticum, vol.* II. *page.* 162.

MULCH, ſtraw half rotten.

MULLOCK, dirt, or rubbiſh.

MULLEIN, the name of a biennial plant, which periſhes ſoon after it has perfected its ſeeds. The leaves ſpread on the ground, are nine or ten inches long, and ſix broad, very woolly, of a yellowiſh white colour, and very little footſtalk. The ſtem riſes four or five feet high, and the upper part of it is garniſhed with yellow flowers, which ſit very cloſe, and from a thick ſpike. Theſe flowers have an agreeable odour, appear in July, and the ſeeds ripen in autumn.

This plant commonly grows by the ſides of highways, and on banks: but if it once gets into the fields in a warm expoſure, and is ſuffered to ſeed there, it will ſoon overrun the whole ground. It may be eaſily deſtroyed by cutting off the ſtem, when it is in flower.

MURE, the cake of apples, grapes, &c. left in the preſs, after extracting the juice.

MURRAIN, or *Gargle*, a contagious diſeaſe among cattle.

The moſt remarkable murrain is that mentioned in the Philoſophical Tranſactions, which ſpread through Swiſſerland, Germany, into Poland, &c.

The contagion ſeemed to propagate itſelf in form of a blue miſt, which fell on the graſs where the cattle grazed, when whole herds, forbearing their food, almoſt died away in twenty-four hours. Upon diſſection were found large corrupted ſpleens, ſphacelous and corroded tongues, &c. And even the perſons who managed them were infected, and died like the beaſts.

Some imagined it had its riſe from noxious vapours thrown out of the earth, in three earthquakes perceived

in the neigbourhood of the place where it began; though Dr. Slare thinks it rather owing to ſwarms of volatile inſects.

The antidote for the ſound, and medicine for the ſick, was equal parts of ſoot, gunpowder, brimſtone, and ſalt, with as much water as would waſh it down: a ſpoonful was the doſe.

The common ſigns of this diſeaſe are a hanging down of the head, gum at the eyes, as big as your finger, growing weakly, ſtaggering, the head ſwelling very much, the breath ſhort, the heart beating, with rattling in the throat; and if you put your hand into the creature's mouth, and find his breath very hot, and his tongue ſhining, the diſtemper is very ſtrong.

As ſoon as you find any of your cattle infected, take a pretty large quantity of blood from them immediately, and give them a drench. Madder root is highly commended for this diſtemper.

MUSHROOM, a genus of imperfect plants, compoſed of a pedicle crowned with a broad head, convex and ſmooth at the top; and hollow, foliated, lamellated, or piſtulous underneath.

It is of the utmoſt importance to diſtinguiſh the right eatable ſort, from ſeveral noxious kinds that have been productive of even fatal accidents: the true ſort appears at firſt with a roundiſh head, not unlike a button. The outſide of this head is then very white, as is likewiſe the ſtalk on which it grows; but its under part, when it is taken off that ſtalk, from which it ſeparates pretty eaſily, is of a lived fleſh colour. Its fleſh is alſo very white within. If this ſort remains undiſturbed, its head will ſpread to a conſiderable ſize, and open at the botom, ſo as to form an almoſt flat ſurface, the under part of which will then be changed to a dark colour.

Moſt of the writers upon gardening have ſpoken ſo confuſedly, not to ſay, of moſt of them, ſo unintelligibly, of the means of propagating this plant, that excepting the authors of the *Maiſon Ruſtique*, and Mr. P. Miller, one is ſometimes puzzled to gueſs at their meaning. The account which this laſt has given in his Dictionary, is the moſt practical, being the method of the gardeners near London, who raiſe annually great quantities of muſhrooms for ſale. The ſubſtance of it is to the following effect.

The ſpawn of muſhrooms, from which only they are propagated, looks like a white mouldineſs ſhooting out in long ſtrings. It is frequently found among the dung of old hot-beds, or in old dunghills, eſpecially when much litter has been mixed with theſe laſt, or the wet has not penetrated ſo as to rot it; or it may be procured by mixing ſome long ſtable dung, which has not been thrown up in a heap to ferment, with ſtrong earth, and then laying this mixture under cover, where it cannot be wet, and where the air may be excluded from it as much as poſſible; for, the more effectually it is kept from air, the ſooner the ſpawn will be produced. It will generally appear in about two months, if the heap has not been laid ſo cloſe together as to heat (for that will deſtroy the ſpawn) and eſpecially if it has been well covered with old thatch, or litter which has lain ſo long abroad as to have loſt the power of fermenting. Theſe are expedients by which the ſpawn of muſhrooms may be procured at almoſt any time, by thoſe who have not already had muſhroom-beds in their gardens, and therefore cannot collect it from their remains: for there are but two months of the year in which it can be gathered from downs or paſtures. Theſe are Auguſt and September; when plenty of muſhrooms ſpring up naturally in many of thoſe places. To propagate them from thence, the ground ſhould be opened about their roots, and ſuch earth as is there found full of ſmall white knobs, which are the offsets, or young muſhrooms ſhould be attentively gathered up, with as much care as can be not to break the lumps, or the earth about them. This ſeed, or rather this ſpawn (for if muſhrooms have ſeeds, they are imperceptible to the eye) ſhould be kept very dry till it is uſed: for the drier it is, the better it will take to the bed, as has been remarkably experienced by Mr. Miller, who declares, that he never ſaw theſe plants produced ſo ſoon, or in ſo great quantity, as from a parcel of their ſpawn which had lain near the oven of a ſtove for upwards of four months, and was become ſo dry, that he deſpaired of its ſucceſs.

The beds for muſhrooms ſhould be made of dung plentifully intermixed with litter, but not thrown in a heap to ferment. The beſt dung for this purpoſe is that which has lain ſpread abroad for a month, or longer. Their breadth ſhould be about two feet and a half at bottom, their length proportioned to the deſired quantity of muſhrooms, and they ſhould be made on dry ground, by ſpreading upon it, firſt a layer of dung about a foot thick, and upon this about four inches deep of ſtrong earth; then a couch of dung about ten inches thick, and upon that another layer of earth, contracting the ſurface of the bed all the way up, till it terminates like the ridge of a houſe. This may be done with three layers of dung, and as many of earth. When it is finiſhed, it ſhould be covered with litter, or old thatch, as well to prevent its drying, as to keep out wet, and after it has remained eight or ten days in this ſituation, it will be of a proper temperature to receive the ſpawn, for which its warmth ſhould be but moderate. The thatch, or litter, ſhould then be taken off, the ſides of the bed ſhould be ſmoothed, and a covering of light rich earth, by no means wet, ſhould be laid all over it, about an inch thick. Upon this the ſpawn ſhould be placed, by laying its lumps about two or three inches aſunder, in ſuch manner as to prevent their ſlipping down, and then the whole ſhould be covered gently with about half an inch thick of the ſame light earth as was uſed before. The covering of litter ſhould then be replaced over the bed, ſo thick as to ſecure it from wet, and to prevent its drying. If theſe beds are made in the ſpring or autumn, when the weather is temperate, the muſhrooms will frequently come up in a month's time: but thoſe which are made in ſummer, when the ſeaſon is hot, or in winter, when it is cold, will not produce them near ſo ſoon. Sometimes too it happens that neither of theſe beds, but moſt particularly thoſe made in the ſummer or winter, yield any muſhrooms before the end of five or ſix months; and that they then produce uncommon quantities, and continue in perfection for a long time.

The great art in managing of theſe beds is, to keep them conſtantly in a due degree of moiſture, and, above all, not to ſuffer them ever to receive too much wet; for that would inevitably deſtroy the ſpawn of the muſhrooms. During the ſummer, they may be uncovered, to admit gentle ſhowers of rain to them at proper times; and if the weather continues dry for a long while together, it will be right to water them gently now and then, but by no means to overdo it. During the winter, they muſt be kept as dry as poſſible, and cloſely covered, leſt the cold air of the ſeaſon ſhould injure them. It will even be right

right in frosty or very cold weather, to lay over them a covering of dry litter, for it must not incline to ferment, and upon that some warm litter shaken from out of a heap of dung. This covering should also be renewed as often as it is found to decay, and, if the cold grows more severe, its thickness should be increased.

The mushrooms thus produced have a finer flavour than any that are gathered in the fields; and if the above directions are observed, they may be had in plenty during the whole year: for each single bed will continue good for several months, and yield great quantities if the spawn takes kindly.

When these beds are destroyed, the spawn for a fresh supply should be taken from them, and laid up in a dry place till the proper season for using it, which should not be sooner than five or six weeks, in order that it may have time to dry well, before it is put into the new bed; for otherwise there will some danger of its succeeding.

MUST, new wine, or wort, before it is fermented.

MUSTARD is an annual plant raised from its seed only. The white mustard, as it is commonly called, is the sort chiefly cultivated in gardens, for a sallad herb in the winter and spring. The seeds of this are sown very thick in drills, either upon a border warmly situated, or if the weather be very cold, upon a gentle hot-bed in the same manner as cresses and other small sallading, and in about ten days or a fortnight after the time of sowing, the plants will be fit for use; for when they are large and have rough leaves, they are too strong to be mixed with sallads.

The best way to save the seeds of this plant, is to sow a spot of ground with it in the spring, to thin the plants when they have about four leaves, and at the same time to hoe down the weeds, as is practised for turnips. This hoeing is to be repeated in about a month after, and the plants are then to be left about eight or nine inches asunder, which will be a sufficient space for the growth of this species. If these hoeings are well performed, in dry weather, they will keep the ground clean till the mustard seeds are ripe. The stalks of this plant, which are branched and hairy, will then be about two feet high, and the ripening of its seed is indicated by the pods changing to a brown colour; immediately after which they should be cut down, dried upon cloths, for two or three days, and then threshed out for use.

The larger sorts of mustard, the seeds of which are used chiefly for sauce, are to be treated in the same manner; excepting that, as they grow much larger, a proportionably greater space must be left between their plants: and as their seeds will not ripen so soon as those of the smaller kind, three hoeings, or rather good deep stirrings, of the ground may be requisite for them. One of these large sorts, which is the common mustard, grows naturally in many parts of England; but is cultivated in the fields for its seeds, of which the sauce called mustard is made; and another sort, which naturally grows in our arable lands, and is also cultivated for use, produces the seeds which are commonly sold under the appellation of Durham mustard-seed. The stalks of the last sort seldom rise above two feet high; but those of the former generally run up to the height of four or five feet.

N.

NAIL, or *Naile*, the weight of eight pounds.

NAPE, or *Neap*, a piece of wood with two or three feet, with which they support the forepart of a loaded wain.

NASTURTIUM. *See the article* CRESS.

NAVE *of a Wheel*, is that short thick piece in the center of the wheel, which receives the end of the axletree, and in which the ends of the spokes are fixed; it is bound at each end with hoops of iron, called the nave-bands; it has likewise in each end of the hole, through which the end of the axletree goes, a ring of iron, called the wisher, which saves the hole of the nave from wearing too big.

NEAT, black cattle, oxen.

NETTLE, the name of a weed well known, and which may be easily destroyed by cutting the roots, before the plant has perfected its seed.

NEWING, yeast, or barm.

NICKING, the name of an operation often performed on the tails of saddle-horses, and by which means they carry them in a more beautiful manner.

Before we describe the operation of nicking, it may be necessary to enquire how the effect of it (the elevation of the tail) is brought about; and in order to know this, and judge with propriety of the operation, we must consider the tail as elevated or lifted up, by one set of muscles, and depressed or pulled down by another.

It is somewhat remarkable, that Snape, Saunier, and Gibson, who are in general pretty exact in their anatomical descriptions, should omit, in their account of the muscles of a horse, to describe those of the tail: for which reason, as a proper opportunity has not offered, to supply this omission, by making a compleat dissection, with that accuracy we could have wished, it is hoped the subsequent imperfect description will be excused, as it was taken only from a tail that was dissected after docking.

Here we observed, that the muscles which elevate the tail, are more numerous, large and strong, than those that depress it; that they are closely connected to the bones of the tail by fleshy fibres, and terminate in strong tendons at the extremity: but the muscles of the latter soon

form into tendinous expanſions, and beſides three large tendons, which are inſerted into the latter bones of the tail, there are ſeveral other ſmall tendons, which run laterally, whoſe uſe moſt probably is to move the tail ſideways. The arteries are four in number, and run ſometimes above the bones of the tail; conſequently eaſily avoided by a dextrous hand, as they cannot readily be wounded by the knife, in dividing the tendons neceſſary to be cut in this operation.

The art of nicking horſes then chiefly conſiſts in a tranſverſe diviſion of theſe depreſſing tendons of the tail, and ſuch a poſition afterwards as will keep their extremities from coming again into contact; ſo that an intervening callus fills up the vacuity: by theſe means an additional power is given to the antagoniſt muſcles, viz. the elevators; the counteraction of the depreſſors being manifeſtly abated by the diviſion of the tendons, and the intervention of the callus.

The uſual method of ſupporting the tail by a pulley and weight, is liable to many exceptions, the extremities of the divided tendons not being by that method kept ſufficiently aſunder; the ſituation of the tail being rather inclined to a perpendicular than a curved direction: this poſition too is liable to many variations, from the different movements of the horſe, and is the reaſon that the tail frequently inclines to one ſide, as the nick may heal up faſter on one ſide than the other; the diſagreeable ſituation the horſe muſt ſtand in, with a weight conſtantly hanging to his tail, is another material objection, beſides the neceſſity of removing it when the horſe is exerciſed, or taken out to water.

To remedy theſe inconveniencies, and perfect this operation, a very ingenious gentleman, who had thoroughly conſidered it, has been ſo kind as to favour us with a draught and deſcription of a machine he contrived for that purpoſe, which has frequently been practiſed with the expected ſucceſs, and indeed at firſt view appears in every reſpect calculated to correct all the defects in the old one: as we doubted not its reception being perfectly agreeable to the public, we have ordered a plate to be engraved, which, with the annexed deſcription, will, we hope, make it very familiar and intelligible to every capacity.

In regard to the operation, it is worth notice, that the extremities of the tendons, which jut out in the operation, need not here be cut off, as is cuſtomarily done; the number of the inciſions muſt be in proportion to the length of the tail, but three in general are ſufficient. The moſt approved method of dreſſing at firſt, is with powdered roſin, and ſpirit of wine, applying a ſoft doſſil of lint or tow, dipped in the ſame, between each nick, and lapping the tail up with a linen cloth and broad fillet; which the next morning ſhould be cut open down the back part of the tail, and the morning after be gently taken off: when it will be proper to plat the hairs, in order to keep them clean, and to ſet the tail, as will be directed in the plate and references.

Every two or three days, the tail ſhould be let down, and the upper part next the rump bathed with hot vinegar; and if it begins to crack, and the hair comes off, a little tincture of myrrh will ſoon put a ſtop to it. To obviate any threatening ſymptoms that may ariſe in regard to the wounds, have recourſe to the remedies uſed on docking.

After ſix or eight days, it will be proper to let the horſe ſtand without the machine for a few hours, and then be rode about, in order to obſerve how he carries his tail; by which means you will the better judge how to faſten it down, whether to confine it cloſer, or give it more ſcope: after the wounds are healed up, it may be neceſſary to keep the tail ſuſpended, till the callus is confirmed, at leaſt for ſome hours in the day; though a greater liberty may now be allowed it.

Thus this machine anſwers every intention, is far preferable to the pulley, as it keeps the tendons properly ſeparated, and the tail in a certain poſition; ſo that the wounds heal up uniformly, without any riſk of its being caſt to one ſide; the horſe alſo is more at eaſe, having no weight conſtantly pulling and teazing him, and may be taken out to water or exerciſe without any inconveniency, or diſturbance.

Directions for the Application of the Nicking Machine; and Explanation of the Plates.

When the hair of the tail is properly platted, and tied with a knot or two at the end, the pad, &c. as deſcribed in Plate XX. Fig. 9. muſt be put on, and the machine, as in Fig. 10. buckled to them, letting the part G in the machine lie over the part of the tail that joins to the horſe's rump; then let an aſſiſtant, ſtanding on the ſide rail of the brake, or any other conveniency that may place him above the horſe, raiſe the horſe's tail very gently, till the knot of the tail gets ſo far beyond the ſtrings L L in Fig. 10. that it may be tied down; which being done, the tail may be let down lower, or taken up higher at pleaſure. It is to be obſerved, that the ligature is not made on the tail itſelf, but on the platted hair, at the extremity of the ſtump.

The machine, Fig. 10. muſt be made of a piece of tough wood, about a foot long, viz. from A to B, and about nineteen inches broad from C to D, and ſeven or eight inches thick. The under part muſt be hollowed, ſo as to let in the horſe's rump, and that the wings C D may reſt on his buttocks. To receive the tail, a groove muſt be cut from G to H, about three inches wide, and three deep at G, leſſening gradually both in height and breadth to H. Holes muſt be made at certain diſtances in the groove, as at H for the ſtring, and a nick cut to receive the billet from the ſtrap K. Two buckles fixed to the machine as at I I.

The pad, &c. are ſufficiently deſcribed in Fig. 9. and its references; the wood muſt be ſloped off from E to C and A, and ſo on the other ſide, to lighten the machine, and hollowed at B, G, and F.

Fig. 9. repreſents a horſe, with his tail in the frame or machine. A is a pad, to which is faſtened a circingle B. C C two ſide ſtraps, one on each ſide the horſe, faſtened to the circingle, to keep the machine from going to either ſide; D, a breaſt-plate, to prevent the pad, &c. ſlipping back. E, a ſtrap fixed to the pad, and buckling to the machine, to keep the tail on the ſtretch at pleaſure. F, the ſtring tied on the hair, to confine the tail down to the machine.

Fig. 10. from A to B is twelve inches; from C to D, meaſured with a ſtring drawn over E F, is nineteen inches. From the top of the groove at E to the bottom G, is three inches. From E to F, the wideſt part of the groove, is three inches, gradually narrowing, as a tail leſſens to its extremity. The dots about H are holes in the groove, through which a piece of tape or pack-thread muſt be put, according

according to the length of the dock, and the diſtance of the knot, to tie the tail down behind the knot. I I, the buckles to receive a ſtrap from the circingle on each ſide, as deſcribed in Fig. 9. which keeps the machine from turning to either ſide. K, the ſtrap with a billet and buckle, which comes along the back from the pad, and is faſtened to the machine, through a nick cut juſt above H. L L, the ſtrings to tie down the tail. B, G, F, the hollow to let in the rump.

Fig. 11. repreſents the horſe with the machine on, ſtanding directly before you, where the depth of it is ſhewn, being three inches.

C D, the extremities of the wings. E F, the upper part. *Bartlet's-Farriery, page* 325.

NIGHT-FALL, the beginning of night.

NOPE, a bull finch, or red-tail, a ſmall ſinging bird, well known.

NUSHED, ſtarved in bringing up.

O.

OAK, a tree well known, and one of the principal materials in building ſhips, &c. being ſtrong in all poſitions.

All the ſorts of oaks are propagated from acorns, which ſhould be ſown as ſoon as poſſible after they are ripe; for if they are kept too long out of the ground, they ſeldom grow.

The manner of ſowing theſe acorns, if deſigned for a ſmall plantation, or to be removed, is, to prepare ſome beds of freſh earth, neither too ſtrong and heavy, nor too light and dry; in theſe beds you ſhould place the acorns in rows one foot aſunder, and about two inches diſtance in the rows, covering them about two inches thick with the ſame freſh earth; obſerving to leave none of them uncovered, to entice the vermin, which may, in a ſhort time, deſtroy all the ſeeds.

In the ſpring, when the plants begin to appear, you muſt careſully clear them from weeds; and if the ſeaſon proves dry, you ſhould refreſh them now and then with a little water, which will greatly promote their growth. In theſe beds the plants ſhould remain until the following autumn, obſerving conſtantly to keep them clear from weeds; at which time you ſhould prepare a ſpot of good freſh earth, in ſize proportionable to the quantity of plants, which ſhould be trenched and levelled: then towards the middle or latter end of October, you ſhould careſully take up the plants, ſo as not to injure their roots, and plant them out in rows three feet aſunder, and eighteen inches diſtance plant from plant; obſerving never to ſuffer the plants to abide long out of the ground, becauſe their roots would dry, and endanger the growth of the plants.

When they are planted, you ſhould lay a little mulch upon the ſurface of the ground, near their roots, to prevent the earth from drying too faſt; and if the ſeaſon ſhould prove very dry, you ſhould give them a little water to ſettle the earth to their roots.

When the plants have taken root in this nurſery, they will require little more care than to keep them clear from weeds, and dig the ground between the rows every ſpring; in doing of which, you ſhould cut off ſuch roots as extend very far from the trunk of the trees, which will render them better for tranſplanting again: you ſhould alſo prune off ſuch ſide-branches as extend themſelves very far, and would retard the upright ſhoot; but you ſhould by no means cut off all the ſmall lateral branches, ſome of which are abſolutely neceſſary to be left on, to detain the ſap for the augmentation of the trunk; for I have often obſerved, where trees have been thus cloſely pruned, that their heads have over-grown their bodies, ſo that they have bent downward and become crooked.

When theſe trees have remained in the nurſery three or four years, they will then be large enough to tranſplant to the places where they are to remain; for it is not proper to let them grow very large before they are planted out; becauſe theſe are very hazardous trees to remove when old, or after they have taken deep root.

The ſeaſon for this work is, as I ſaid before, in the autumn; at which time, if they are carefully taken up, there will be little danger of their ſucceeding. When they are planted, the ſurface of the ground ſhould be mulched about their roots, to prevent its drying too faſt; and if the ſeaſon is very dry, they ſhould be watered, to ſettle the earth to their roots, which may be repeated two or three times in very dry weather; but you muſt carefully avoid giving them too much water, which is very injurious to theſe trees, when newly removed.

You ſhould alſo ſtake them, to prevent their being ſhaken and diſturbed by the winds, which would retard their rooting. In tranſplanting of theſe trees, you ſhould by no means cut their heads, which is too much practiſed: all that ſhould be done, muſt be only to cut off any bruiſed or ill-placed branches, which ſhould be taken off cloſe to the place where they are produced: but there can be no greater injury done to theſe trees than to ſhorten their ſhoots; for when the leading bud, which is abſolutely neceſſary to draw and attract the nouriſhment, is taken off, the branch often decays entirely, or, at leaſt, down to the next vigorous bud.

The trees, thus raiſed and managed, will, if planted in a proper ſoil, grow to a conſiderable magnitude, and are very proper for a wilderneſs in large gardens, or to plant in clumps in parks, &c. but if they are deſigned for timber, it is much the better method to ſow the acorns in the

places

places where they are to remain; in order to which, you ſhould provide yourſelf in autumn with a ſufficient quantity of acorns, which ſhould be always taken from ſtraight, upright, vigorous-growing trees; theſe ſhould be gathered from under the trees as ſoon as may be after they are fallen, and, if poſſible, in a dry time, laying them thin in ſome open room to dry; after which they may be put in dry ſand, and preſerved in a dry place until the end of November, when you ſhould prepare the ground for planting them.

The directions here given are deſigned only for ſmall plantations in a garden or park, which are only for pleaſure: but where theſe trees are cultivated with a view to profit, the acorns ſhould be ſown where the trees are deſigned to grow; for thoſe which are tranſplanted will never grow to the ſize of thoſe which ſtand where they are ſown, nor will they laſt near ſo long ſound: for in ſome places, where theſe trees have been tranſplanted with the greateſt care, and they have grown very faſt for ſeveral years after, yet they are now decaying, when thoſe which remain in the place where they came up from the acorns, are ſtill very thriving, and have not the leaſt ſign of decay: therefore, whoever deſigns to cultivate theſe trees for timber, ſhould never think of tranſplanting them, but ſow the acorns on the ſame ground where they are to grow; for the timber of all thoſe trees which are tranſplanted, is not near ſo valuable as that of the trees from acorns. I ſhall therefore add ſome plain directions for the ſowing of acorns, and managing of the young trees, during their minority, until they are out of danger, and require no farther care.

The firſt thing to be done is that of fencing the ground very well, to keep out cattle, hares, and rabbits; for if either of theſe can get into the ground, they will ſoon deſtroy all the young trees. Indeed, they will in a few years grow to be out of danger from the hares and rabbits; but it will be many years before they will be paſt injury from cattle, if they are permitted to get into the plantation; therefore, durable fences ſhould be put round the ground. If, in the beginning, a pale fence is made about the land, which may be cloſe at the bottom, and open above; and within the pale a quick-hedge planted, this will become a good fence by the time the pale decays, againſt all ſorts of cattle; and when the trees will have got above the reach of hares and rabits, ſo that they cannot injure them; for the bark of the trees will be too hard for them to gnaw.

After the ground is well fenced, it ſhould be prepared, by ploughing of it three or four times, and, after each ploughing, to harrow it well, to break the clods, and cleanſe the ground from couch, and the roots of all bad weeds. Indeed, if the ground is green ſward, it will be better to have one crop of beans, peaſe, or turnips, off the ground, before the acorns are ſown, provided theſe crops are well hoed to ſtir the ſurface, and deſtroy the weeds: for if this is obſerved, the crop will mend and improve the land for ſowing; but in this caſe the ground ſhould be ploughed as ſoon as poſſible, when the crop is taken off, to prepare it for acorns; which ſhould be ſown as ſoon as may be after the acorns are ripe: for although theſe may be preſerved in ſand for ſome time, yet they will be apt to ſprout; and, if ſo, the ſhoots are in danger of being broken and ſpoiled; therefore we would adviſe the ſowing early, which is certainly the beſt method.

In making choiſe of the acorns, all thoſe ſhould be preferred which are taken from the largeſt and moſt thriving trees; and thoſe of pollard trees ſhould always be rejected, though the latter are generally the moſt productive of acorns; but thoſe of the large trees commonly produce the ſtrongeſt and moſt thriving plants.

The ſeaſon for ſowing of the acorns being come, and the ground having been ploughed, and levelled ſmooth, the next work is to ſow the acorns; which muſt be done by drawing of drills acroſs the ground, at about four feet aſunder, and two inches deep; into which the acorns ſhould be ſcattered, at two inches diſtance. Theſe drills may be drawn either with a drill-plough, or by hand, with an hoe; but the former is the moſt expeditious method, therefore in large plantations ſhould be preferred. In the drawing of the drills, if the land has any ſlope to one ſide, theſe ſhould be made the ſame way as the ground ſlopes, that there may be no ſtoppage of the wet by the rows of plants croſſing the hanging of the land. This ſhould be particularly obſerved in all wet ground, or where the wet is ſubject to lie in the winter. When the acorns are ſown, the drills ſhould be carefully filled in, ſo as to cover the acorns ſecurely; for, if any of them are expoſed, they will entice the birds and mice; and if either of theſe once attack them, they will make great havock with them.

The reaſon of my directing the drills to be made at this diſtance, is for the more convenient ſtirring of the ground between the rows, to keep the young plants clean from weeds: for if this is not carefully done, it cannot be expected, that the young plants ſhould make much progreſs; and yet this is generally neglected by many who pretend to be great planters, who are often at a large expence to plant, but ſeldom regard them after: ſo that the young plants have the difficulty to encounter the weeds, which frequently are four or five times the height of the plants, and not only ſhade and draw them, but alſo exhauſt all the goodneſs of the ground, and conſequently ſtarve the plants: therefore, whoever hopes to have ſucceſs in their plantations, ſhould determine to be at the expence of keeping them clean for eight or ten years after ſowing, by which time the plants will have obtained ſtrength enough to keep down the weeds: the neglecting of this has occaſioned ſo many young plantations to miſcarry, as are frequently met with in divers parts of England.

About the end of March, or beginning of April, the young plants will appear above ground; but before this, if the ground ſhould produce many young weeds, it will be good huſbandry to ſcuffle the ſurface over with Dutch hoes, in a dry time either the latter end of March, or the beginning of April, to deſtroy the weeds, whereby the ground will be kept clean, until all the plants are come up ſo far as to be plainly diſcerned; by which time it may be proper to hoe the ground over again; for by doing it early, while the weeds are ſmall, a man will perform more of this work in one day than he can in three or four, when the weeds are grown large: beſides, there will be great hazard of cutting off or injuring the young plants, when they are hid by the weeds; and ſmall weeds, being cut, are ſoon dried up by the ſun; but large weeds often take freſh root, and grow again, eſpecially if rain ſhould fall ſoon after, and then the weeds will grow the faſter for being ſtirred; therefore it is not only the beſt method, but alſo the cheapeſt huſbandry, to begin cleaning early in the ſpring, and to repeat it as often as the weeds are produced.

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The firſt ſummer, while the plants are young, it will be the beſt way to perform theſe hoeings by hand; but afterwards it may be done with the hoe-plough; for as the rows are four feet aſunder, there will be room enough for this plough to work; and as this will ſtir and looſen the ground, it will be of great ſervice to the plants; but there will require a little hand labour where the plough is uſed, in order to deſtroy the weeds, which will come up in the rows between the plants; for theſe will be out of the reach of the plough, and, if they are not deſtroyed, they will ſoon over-grow and tear down the young plants.

After the plants have grown two years, it will be proper to draw out ſome of them, where they grow too cloſe; but in the doing of this, great care ſhould be had not to injure the roots of thoſe left; for as the plants which are drawn out are only fit for plantations deſigned for pleaſure, ſo theſe ſhould not be ſo much regarded in their being removed, as to ſacrifice any of thoſe which are deſigned to remain. In the thinning of theſe plantations, the plants may, at the firſt time, be left about one foot aſunder, which will give them room enough to grow two or three years longer; by which time it may be eaſy to judge which are likely to make the beſt trees. Therefore theſe may be then fixed on, as ſtandards, to remain; though it will be proper to have a greater number at this time marked than can be permitted to grow, becauſe ſome of them may not anſwer the expectation: and, as it will be improper to thin theſe trees too much at one time, ſo the leaving double the number intended at the ſecond thinning will not be amiſs. Therefore, if they are then left at about four feet diſtance in the rows, they will have room enough to grow three or four years longer; by which time, if the plants have made good progreſs, their roots will have ſpread over the ground; therefore it will be proper to take up every other tree in the rows. But, by this, I do not mean to be exact in the removing, but to make choice of the beſt plants to ſtand, which ever rows they may be in, or if they ſhould not be exactly at the diſtance here aſſigned: all that is deſigned here, is, to lay down general rules, which ſhould be as nearly complied with as the plants will permit: therefore every perſon ſhould be guided by the growth of the trees in the performance of this work.

When the plants have been reduced to the diſtance of about eight feet they will not require any more thinning. But in two or three years time, thoſe which are not to remain will be fit to cut down, to make ſtools for underwood; and thoſe which are to remain, will have made ſuch progreſs as to become a ſhelter to each other; for this is what ſhould principally be attended to, whenever the trees are thinned; therefore, in all ſuch places which are much expoſed to the wind, the trees ſhould be thinned with great caution, and by ſlow degrees, for if the air is let too much at once into the plantation, it will give a ſudden check to the trees, and greatly retard their growth, but, in ſheltered ſituations, there need not be ſo great caution uſed as in thoſe places; the plants will not be in ſo much danger of ſuffering.

The diſtance which I ſhould chuſe to allow to thoſe trees which are deſigned to remain for timber, is, from twenty-five to above thirty feet, which will not be too near, where the trees thrive well; in which caſe their heads will ſpread, ſo as to meet in about thirty, or thirty-five years: nor will this diſtance be too great, ſo as to impede the upright growth of the trees. This diſtance is intended that the trees ſhould enjoy the whole benefit of the ſoil. Therefore, after one crop of the underwood, or, at the moſt, two crops are cut, I would adviſe the ſtubbing up the ſtools, that the ground may be intirely clear, for the advantage of the growing timber, which is what ſhould be principally regarded: but, in general, moſt people have more regard for the immediate profit of the underwood than the future good of the timber, and, frequently, by ſo doing, ſpoil both: for, if the underwood is left after the trees have ſpread ſo far as that their heads meet, the underwood will not be of much worth; and yet by their ſtools being left, they will draw away a great ſhare of nouriſhment from the timber-trees, and retard them in their progreſs.

The ſoil in which oak makes the greateſt progreſs, is a deep rich loam, in which the trees grow to the largeſt ſize; and the timber of thoſe trees which grow upon this land, is generally more pliable than that which grows on a ſhallower or drier ground; but the wood of the latter is much more compact and hard. Indeed there are few ſoils in England in which the oak will not grow, provided there is proper care taken in their cultivation; though this tree will not thrive equally in all ſoils: but yet it might be cultivated to a national advantage upon many large waſtes in many parts of England, as alſo to the great profit of the eſtates where theſe tracts of land now lie uncultivated, and produce nothing to the owner. And, ſhould the preſent temper of deſtroying the timber of England continue in practice ſome years longer, in the ſame degree which it has for ſome years paſt, and as little care be taken to raiſe a ſupply, this country, which has been ſo long eſteemed for its naval ſtrength, may be obliged to ſeek for timber abroad, or be content with ſuch a naval ſtrength as the poor remains of ſome frugal eſtates may have left growing: for, as to the large foreſts, from whence the navy has been ſo long ſupplied, a few years will put an end to the timber there: and how can it be otherwiſe, when the perſons to whoſe care theſe are committed, reap an advantage from the deſtruction of the timber? *Miller's Gard. Dict.*

OAK-BARK. *See the article* BARK *and* TAN.

OATS, the name of a well known ſpecies of grain, and of which Mr. Miller reckons four ſorts, cultivated in England, *viz.* the white, the black, the brown or red, and the naked oat, in which, though ſuppoſed to be only accidental varieties, he has never obſerved any alteration where they have been cultivated ſeparately for many years. Their principal difference is in the colour of their grain.

The white ſort, which is moſt common about London, makes the whiteſt meal, and is chiefly cultivated where the inhabitants live much upon oat-cakes. The black oat is more cultivated in the northern parts of England, and is eſteemed a very hearty food for horſes. Red oats are much cultivated in Derbyſhire, Staffordſhire, and Cheſhire, but are ſeldom ſeen in any of the counties near London; though, as they are a very hardy ſort, and yield a good increaſe, they will be well worth propagating, eſpecially in all ſtrong lands. The ſtraw of theſe oats is of a browniſh red colour, as is alſo the grain, which is very full and heavy, and eſteemed better food for horſes than either of the other ſorts. The naked oat is leaſt common in the ſouthern parts of England; but in the northern counties, in Scotland, and in Wales, it is pretty much cultivated, and is particularly eſteemed, becauſe its

grain

grain threſhes clean out of the huſk, and need not be carried to the mill, to be made into oat-meal or griſt.

As oats are very hardy and will thrive in almoſt any ſoil, they have been a great improvement to many eſtates in the northern parts of this kingdom, where, though ſown even ſo late as April, and in ſtiff ground, they have ripened early, and yielded a good crop. However, February, or March, according as the ſeaſon proves early or late, is a more common and better time for ſowing this corn, of which it may always be right to ſow the largeſt grain ſort earlieſt.

Oats are often ſown after a crop of wheat, rye, or barley; in which practice the common method is to turn in the ſtubble, with one ploughing, about the beginning of February, and ſow the ſeed with a broad caſt at twice, harrowing it in, once after the ſowing, and five or ſix times after the ſecond, obſerving to draw the harrow once or twice acroſs the furrows, to break the clods and cover the ſeeds; but at the other times to harrow in the ſame direction as the furrows, leſt the ſtubble ſhould be raiſed on the ſurface. But it would be much better huſbandry to plough in the ſtubble in autumn, that it may rot in winter, and to give the land another ploughing, and a good harrowing, juſt before the oats are ſown. This will render the ground finer, and fitter to receive the grain, the increaſed produce of which will amply repay the extraordinary expence of tillage. M. Duhamel, after obſerving that every farmer knows, though but few practice it, that all crops of ſpring corn are greatly bettered by this method, inſtances the example of M. d'Elu, one of his correſpondents, who having given three ploughings to ſome of his oat-lands, had in 1759, a year remarkably dry, and unfavourable to ſpring-corn, a plentiful crop of oats, which held up well till they were perfectly ripe, and yielded excellent grain.

Another thing, which I muſt alſo inſiſt on, is, that if farmers were to follow the directions before given, in regard to the changing of crops, by which means oats, which impoveriſh the ground, would always ſucceed ſome one of the meliorating crops, the return would be much more plentiful than in the common way, becauſe the earth would be in a much looſer ſtate.

When oats, as it frequently happens, are ſown upon a lay, or on ground newly broken up, after only one ploughing, which is given in January, when the earth is moiſt, to turn down the ſward; the harrowing muſt be in the ſame direction as the furrows, or but very little acroſs, for fear of raiſing the turf. But this again is bad huſbandry: for the ground would be brought to a much better tilth for other grain, as a preparation for which this ſowing is chiefly intended, by giving the ſward time to rot before the oats are ſown; becauſe the roots of the graſs will prevent thoſe of the corn from ſtriking downward.

Black oats delight in a moiſter ſoil than the white ſort, and, being a hardier plant, may be ſown a month earlier. The white, which prefer a dry land, and will do well on gravel and ſand, are the beſt of all corn for ground ſubject to quick-graſs or weeds, becauſe it may be ploughed later for them, and they riſe ſooner, and top the weeds better than black oats. The weather cannot be too dry when white oats are ſown; though the ground may then be moiſter for them than barley will endure; becauſe this laſt, having a thinner coat, is ſooner killed by imbibing the wet, which may perhaps burſt many of its veſſels; whereas white oats, being protected by a double huſk, better reſiſt the entering of the moiſture. Mr. Liſle, who makes theſe remarks, adds, that according to the beſt of his obſervations, white-oats require a rich feeding ſoil; becauſe their haulm, or ſtraw, running to a great largeneſs, cannot be ſupported without good juices and moiſture; that white chalky ground, though in never ſo good heart, will be unfruitful with white oats; and that a mixed mould, between white earth and red clay, of which there is a great deal in the hilly parts of Hampſhire, is not feeding enough for them. The red and the white clays, when in good heart, carry moiſture enough, and are very fit for this grain.

The common allowance of ſeed oats is four buſhels to an acre; but Mr. Miller rightly thinks three buſhels more than enough: and the uſual produce is about twenty-five buſhels from an acre; though he obſerves, that he has ſometimes known more than thirty buſhels reaped from that extent of ground; and we can ſay with truth, from an accurate account now in our poſſeſſion, that a gentleman, who is indeed an excellent huſbandman, has had, for a continuance, forty-eight buſhels of oats from off each acre of his land ſown with that grain. I do not mean forty-eight buſhels of naked oats; for the produce of that ſort is the leaſt of any in bulk, becauſe its grains are ſmall, and lie very cloſe together: but they make up in value, for what is wanting in meaſure. White oats always produce a greater increaſe than black oats. Mr. Liſle threſhed a ſtack of twenty-eight loads of the former, and found it yield more grain than a ſtack of thirty-eight loads of the latter; and farmers in general account an ordinary crop of white oats as good as a middling crop of black oats. This laſt ſort is alſo moſt liable to blight, eſpecially if a hot ſummer follow a dry cold ſpring, and the grain has been ſown on lay ground. Their culture is alike; and the manner of mowing and ordering them at harveſt exactly the ſame. Only it is to be obſerved, that white oats are apt to ſhed moſt as they lie, and black oats as they ſtand.

In the year 1709, Mr. Liſle ſowed, in the beginning of May, in ſome of his wheaten ground, where the corn had been killed in the preceding hard winter, rath-ripe barley in one part, and ſhort grained white oats, which he diſtinguiſhes by the name of white Poland oats in another. Both grains were ſown on the ſame day, in an equally fertile, moiſt and well tilled ground. He made no doubt but that the Poland oat would be firſt ripe, and was therefore ſurpriſed to ſee the rath-ripe barley ſpring up ſooneſt, by four or five days: but reflecting on the nature of each grain, he ſoon concluded the reaſon to be, that the oat having a double hull, and being conſequently better guarded from moiſture, could not imbibe the vegetable water ſo ſoon as the barley; but that, the texture of the flour of the oats, and the infolded fibres of the incloſed plant being ſofter, it would conſequenty grow faſter. From hence he infers, that, to ſecure the growing of Poland oats without rain, they muſt be committed to the earth before it becomes ſo dry as is proper for the ſowing of barley, not only becauſe the oats require more moiſture to make them grow, but alſo becauſe they lie ſo many days longer in the ground, before they come up, than the barley does.

When oats are about four inches high, intelligent huſbandmen run a wooden roller over them, after a ſhower of rain has ſoftened the clods, by the breaking of which in this manner, freſh earth is laid to the roots of the plants,

plants, their tillering is conſiderably increaſed, if they have not been ſown too thick, and the ſurface of the field is ſmoothed; ſo that the mowers, at harveſt, are able to cut cloſe to the ground, as it is very fit they ſhould, becauſe oats ſeldom grow high. Both oats and barley ſhould be carefully weeded.

Oats are ripe when the ſtraw turns yellow, the grain become hard, and the chaff begins to open and ſhew the ſeed. When mowed, they are generally let lie ſome time for the dew and rain to plump them, and make them threſh well, and, if weedy, to kill the weeds: but if rain wet them much, they ſhould be carried off as ſoon as they can be got tolerably dry again, or they will ſhed; for oats may be inned the wetteſt of any corn, if the weeds among them be but dead. Even in very rainy harveſts, when other grain is ſpoiled, this will receive little or no damage, the ſurface of its ſtraw and ears being ſo ſmooth and compact as to turn off water, and of ſo dry a nature, that, though houſed wet, they will not heat in the mow, or become mouldy, as other grains uſually do. This is a vaſt advantage in nothern climates, where the harveſt is generally late, and the autumn wet.

M. Duhamel is ſtrongly of opinion, that farmers, eſpecially thoſe who keep many cattle, would find their account in houſing their oats directly, without letting them lie out after they are cut, as is the common way, that rain and dews may moiſten, and conſequently ſwell their grain. He earneſtly adviſes huſbandmen to try the experiment upon a part of their crop; "becauſe," ſays he, "the fodder will, by this means, certainly be much better for cattle, and much leſs grain will be loſt in the field. It may be objected, that theſe oats will be difficult to threſh; to which I anſwer, that if this be the only inconvenience, the ſuperior quality of the fodder, and the ſaving of a quantity of grain, which would otherwiſe be ſhed, will probably more than pay the extraordinary wages of the threſher.

"But allowing that the oats thus houſed cannot be threſhed quite clean, and that ſome grain will neceſſarily remain in the ears, I ſay, that this will not be loſt to the farmer; for he is obliged to give his cattle unthreſhed oats, and they will eaſily find the grains remaining in the ſtraw, which will not perhaps exceed the quantity that would have been dropped in the field: and even granting, though it will not happen, that the greateſt part of the grain be left in the ear, ſtill it will not be loſt in the hands of an intelligent farmer; for what ſhould hinder him from giving it to his horſes? Suppoſing that four ſheaves yield a buſhel of oats, he need only give his horſes thoſe ſheaves inſtead of a buſhel of corn. They will certainly be longer in feeding upon four ſheaves, than upon a buſhel of cleated oats; and at the ſame time they will eat ſome ſtraw with corn, which will ſupply the place of other fodder, and probably prove a more healthy food." This method may be particularly beneficial to ſuch as live in very hot countries, or in very dry ſeaſons.

Mr. Liſle, refuting the opinion of thoſe who think that oats cut green will ripen while they lie in ſwarth, ſays, "If, by ripening be meant ſhrinking, drying, or withering, I muſt allow the poſition; but if the countryman will have it, that the greeniſh oat, cut a fortnight or ten days, or be it but a week, before it is ripe, will proceed in its vegetable increaſe, and ſwell as well as harden by lying in ſwarth, I muſt deny it. This year (1707) I made a full experiment of this matter; for when the ſpring corn was ſown, the ground being generally dry, half the oats and barley came not up till the latter end of May, when rain came, whereby in moſt places half the crop was edge-grown. The forward oats being then in danger of ſhedding, we were forced to cut down the greeniſh corn with the ripe, when otherwiſe we ſhould have waited ten days longer. I let them lie in ſwarth about a week, and, when I carted them, I found the hull of the greeniſh oat had got a riper colour, and the pith was well hardened, but pitifully lean and ſhrunk; ſo that though this is to be done on neceſſity, yet it ought not to be practiſed with ſuch indifference as is uſual among farmers. Note, the pith of theſe green oats was well paſt the milk, and came to a floury ſubſtance."

The ſame gentleman adds, that oats are the worſt of all grain to keep, becauſe of the great moiſture in them, and their conſequent aptneſs to heat when laid in a heap; and that when the heat has been ſuch as to ſpoil them for growing, their hulls look as red as a fox.

The meal of oats makes tolerably good bread, and is the common food of the country people in the North. In ſome places beer is made with this grain: in Ruſſia in particular the poorer ſort make with it a drink, which they call *quas*; but its principal uſe is for the food of horſes, for which purpoſe it is reckoned very wholeſome, being ſweet and of an opening nature: but it muſt not be given them before it has ſweated in the mow, or been otherwiſe dried, leſt it ſhould prove too laxative.

The very long drought of the ſummer 1762, ſhewed another very profitable uſe of oats on ſuch occaſions; and probably it will anſwer equally well in the winter. Some milk-men near London boiled oat-meal in the water which they give their cows to drink, and found that the expence was abundantly repaid, by the additional quantity of milk which theſe cows yielded more than thoſe which had not this maſh.

The following Letter from Mr. Lamb, *on the beſt Method of cultivating Black Oats, and recommending more frequent Ploughings than any uſually afforded them, will, we are perſuaded, be acceptable to our Readers.*

Gentlemen,

"Having been for many years a practical farmer in the eaſtern part of the county of Eſſex, you will not, I hope, think me impertinent in troubling you on the culture of black oats, which I have very often to great advantage ſown.

"Moſt of my neighbours prefer the white Poland oat, which may, I own, in ſome circumſtances of ſoil and ſituation, be beſt. I prefer the black oats becauſe they are hardieſt, for which reaſon they ſuit beſt with my convenience; for, as a conſiderable tract of the farm I occupy is light land, I am under a ſort of neceſſity of ſowing this ſoil early, or, if a dry ſummer followed, I ſhould have no return at harveſt.

"Few people allow more than one ploughing for a crop of oats; but ſuch as follow this practice are very wrong-headed; for they may aſſure themſelves, that no crop pays better for ploughing than oats; and it is on this account that I generally give my land deſigned for oats three tilths; whence I am morally certain ariſes the largeneſs of my crops, for I have ſeldom under five, oftener ſix, and very frequently ſeven quarters from an acre, throughout a field.

"Your readers will not be ſurpriſed at my having ſuch good crops, when I obſerve, that I almoſt every year ſow ſome oats on a fallow that has been well dunged; and this I aver to be good huſbandry, as it abates the rankneſs of the ſoil, kills many of the weeds, and prepares the land in an excellent manner for a ſucceeding crop of ſweet wheat; but I muſt obſerve, that I always clear my land of the ſtiff oat-ſtubble before I attempt to plough for the wheat.

"I have already ſaid that I ſow black oats early on my light land: by early, I mean as early as the firſt week of February, by which time I have generally an opportunity of getting the land in proper order, for a light ſoil is ſoon wet, ſoon dry.

"Let me mention once more to your readers, that it is on a light ſoil, which is apt to burn a crop, that I ſow my black oats ſo early as the beginning of February; for ſhould any of them attempt to ſow them ſo early in a moiſt, cold, ſtiff ſoil, and a hard froſt ſhould follow, the young blade would, in all probability, be killed.

"I muſt alſo remark, that when I ſow oats thus early, it is generally under furrow; yet I ſometimes ſow them broad caſt, and plough them in.

"The quantity of ſeed I, for the moſt part, uſe, is about three buſhels, which I find to be enough; nay, I have ſometimes from only two buſhels had a good crop; but then I have been particularly careful and attentive to the goodneſs of the ſeed, without which precaution I ſhould not, unleſs the ſeaſon had been very favourable indeed, have ſucceeded.

"I have found it a very good way to ſow firſt half my quantity of ſeed under furrow, and afterwards, ſowing the remainder broad-caſt, harrow it in; and this is often my practice when I ſow the latter end of February, or the beginning of March.

"When I ſow oats after wheat, which however is not very frequently, I turn up the ſtubble as ſoon as I conveniently can after harveſt, and leave it rough through the winter. The firſt fine weather after Chriſtmas, I lay it down ſmooth with the harrows, and immediately give it a croſs ploughing.

"As ſoon as February comes in, if it is not a hard froſt, I make the land as fine as I poſſibly can by the harrows, raiſing a fine looſe mould to the ſurface, which is to be the bed for the oats to lie in; for I ſow my oats directly under furrow; after which I paſs a moderate-ſized roller over the field, and then give it a ſlight ſcratch with a pair of light harrows.

"This huſbandry generally produces me a crop I have no reaſon to complain of.

"My chief reaſon for troubling you with this letter is, to endeavour to perſuade my brother farmers that they do not, in general, allow their oats a ſufficient number of ploughings, one being the ſtated quantity.

"If they would plough twice for this crop, they would receive more than twenty ſhillings an acre for their trouble; but if they would conſult their own intereſts, and allow three ploughings, it would often make fifty pounds difference to them in a field of twenty acres: this they will, perhaps, think wonderful; but it is no leſs true.

"The black oats require particularly to be ſown early, eſpecially if the farmer wiſhes to have them of a fine gloſſy ebon colour, and that the crop ſhould corn well; for if they are ſown late, and wet weather follows ſoon after ſowing, they will be apt to run all to ſtraw; and if dry weather, and the ſoil is gravelly, it is a chance b they are burnt up.

"I have found by experience, that black oats will yie a very large crop after turnips; and this I believe is ſimp owing to their being ſown in a fine tilth; for the mou cannot but be reduced to very ſmall particles if a crop turnips has been well huſbanded, eſpecially if it is in light ſoil.

I am, &c.

East of Chelmsford, Eſſex. J. LAMBE.

Wild OATS, a ſpecies of oats difficult to be extirpate where they have once taken poſſeſſion; for ripening be fore harveſt, and ſcattering their ſeed round them, the will remain in the ground till it is ploughed up again though it be for a whole year, ſome ſay four or five years and will then come up with the corn. The ſureſt way t deſtroy them, is to lay the ground down to clover, an to mow the oats and clover together before the oats ar ripe.

OILS, the beards, or prickles of barley, &c.

OLLET, fuel of any kind.

OMY, mellow; ſpoken of land.

OPE-LAND, ground that is looſe or open, from it being ploughed up every year.

ORCHARD-GRASS, the name of a ſmall, coarſe but very ſweet graſs. It is of very quick growth, an may poſſibly hereafter be cultivated to advantage.

ORE-WEED, a general name for weeds growing a the bottom of the ſea, and alſo on the muddy and rocky parts of the ſhore.

Sea-weeds are ſo beneficial a manure, that farmers ought not to grudge the expence of carrying them a few miles. In Devonſhire, Cornwall, and other maritime parts of England, theſe weeds are laid in heaps till they are rotten, and then ſpread upon the land, about a load to three rods: but this laſts only one year, unleſs ſand, or ſtiff earth, according to the quality of the ſoil intended to be improved, be laid on or mixed with them; and then they become a laſting manure. In ſome places, theſe weeds are gathered in heaps, and burnt as ſoon as they are dry; after which about a buſhel of their aſhes is laid on upon three rods of ground. But theſe, like all other aſhes, ſhould be mixed with ſand, or ſtiff earth, if you would have the land laſt good: otherwiſe, they are only an improvement for a year. Theſe aſhes are particularly good for graſs grounds over-run with moſs. Looſe ſandy ſoils are likewiſe peculiarly benefited by this weed: but being a ſub-marine plant, the wind and ſun ſoon exhale its moiſture; ſo that the more ſpeedily it is taken from the ſhore, where ſtorms often throw it up in great quantities, the better it is. When ſpread on the ground, and afterwards covered over, it ſoon diſſolves into a ſalt oily ſlime, proper to fertilize and bind light ſoils. This is the moſt approved way of applying it: though ſome lay it naked and freſh from the ſea, upon their barley lands, to wards the end of March and beginning of April, and have a good crop of corn: but ſuch quantities of rank weeds are apt to ſhoot up afterwards, that no wholeſome plant is to be expected that year.

The value of the lands all along the coaſt of Scotland has been more than doubled by the uſe of this excellent manure. It is chiefly uſed there for barley; and the farmer

farmers watch every opportunity when it is thrown in by the ſea, and lay it on at all ſeaſons, in autumn, winter, and ſpring. But if they could chooſe their time, it would probably do beſt about the month of March; for being then ploughed into the ground, and afterwards ploughed up again to the ſeed, it would be incorporated and blended with the ſoil; whereas, if it be laid on in autumn, before the fallowing or firſt ploughing, it is too much waſted before the ſpring; and if it be laid on the ſeed-furrow, it is apt to burn the ground in a dry ſeaſon, though it will do very well in this method in a wet ſummer. Its effects are but juſt felt the ſecond year; though it is laid on thicker upon ſtrong clay land, which receives no other manure for three crops, viz. barley, oats, peaſe, and beans; a method which might, perhaps, be altered for the better by omitting the oats, and ſowing alternately barley, and peaſe and beans, and laying on the ſea-ware, as theſe weeds are commonly called, for every ſecond crop of peaſe and beans.

We ſee by the abridgement of Mr. Scott's account of the manner of uſing ſea-ware in Scotland (publiſhed by Mr. Maxwell in his Miſcellaneous Papers) that much of this valuable manure muſt neceſſarily be loſt through want of proper management: for they have no reſervoirs to keep it in, when thrown aſhore at a ſeaſon in which they cannot uſe it, or where there is no ground in tilth, as is generally the caſe in winter, and during the buſy part of their hay and corn harveſt. It ſhould be collected on theſe occaſions, and lodged in a place free from any running water; and, as it is equally beneficial to ſtrong or light lands, it might be there covered with ſand or clay, according to the nature of the ſoil for which it is intended. This will prevent its being parched by the ſun, or its diſſolving into a putrid maſs, which if not ſecured in this manner, would either be waſhed away by rains, or fly off into the air; whereas, when thus covered, it would greatly enrich the clay or ſand, and render them good manures for their oppoſite ſoils. If it be thrown aſhore at a time when it can be ploughed in directly, that is certainly the beſt manner of uſing it.

Mr. Scott obſerves, that there is a kind of land all along the coaſt, which is gravelly, and covered over ſo thick with ſea-ſtones, that, to look at it, one would not think corn could ſpring through them; and another ſort of land, which is a deadiſh ſand. To both theſe grounds ſea-ware is the only manure; for dung of all kinds has been often tried, but with no ſucceſs; and yet ſea-ware makes them bring excellent crops of barley. This kind of ground is ſeldom ploughed more than twice, and the ſea-weed is generally laid on before the firſt ploughing. Barley is ſowed during two years, and peaſe the third; a freſh manure of ſea-weed being laid on each year that barley is ſown. As little wheat is cultivated in the country where Mr. Scott lived, the farmers there might probably improve their practice of raiſing barley and peaſe, by ſowing them alternately, and laying the ſea-ware to the peaſe. In the ſummer it is carried to a diſtance from the ſea, and laid upon ley-ground, (arable land under graſs) which, though in very ill heart, will bear a good crop of oats with only once ploughing, or of barley if ploughed again in the ſpring.

Another kind of ſea-ware of a much ſtronger nature than that which is thrown up by the waves, is cut from the rocks at low water, and will laſt three years. It coſts more labour, but brings greater recompence. Mr. Scott thinks the beſt time of laying this on the ground would be in autumn, before the land is ploughed rough for a ſpring crop.

The farmers on the coaſt of Scotland (and I believe the ſame may be ſaid, in general, of thoſe in moſt of the maritime parts of England) prefer this manure to any other, eſpecially for their light grounds; and it has the advantage of being much more eaſily tranſported, becauſe one load of it will go as far as two of dung.

It does very well in kitchen gardens, where Mr. Scott ſays he has ſeen pot-herbs and roots of an extraordinary ſize produced by its help; to which he adds, that he has known fruit-trees, perfectly barren before, rendered extremely fruitful by laying this manure about the roots.

Mr. Duhamel likewiſe informs us that theſe ſea-weeds are uſed with great ſucceſs in the maritime provinces of France.

OST *Ooſt*, or *Ouſt*. *See* OUST.

OVER-REACH, a wound in the fore-heel of a horſe, made by the point of the hind-ſhoe.

When this wound is only ſlight or ſuperficial, it is, in general, very eaſily cured by waſhing it clean, and applying the wound ointment: but it ſhould be obſerved from the nature and manner of the injury, where the blow has been ſmart, that it differs widely from a common cut; the part here being both torn and bruiſed, and conſequently it requires to be properly digeſted, in order to lay a good foundation for healing.

For this purpoſe, after waſhing out any dirt or gravel with ſope-ſuds, &c. let the wound be digeſted, by dreſſing it with doſſils of lint dipped in an ounce of Venice turpentine, divided with the yolk of an egg, to which half an ounce of tincture of myrrh may be added; over this dreſſing it would be adviſable to apply the turnip poultice, or that with ſtrong beer grounds and oatmeal, three or four times, or oftener, till the digeſtion is procured, and then both theſe dreſſings may be changed for the precipitate medicines, or the lime-water mixture; obſerving always to apply the doſſils carefully to the bottom, to fill up the ſore with the ſame even to the ſurface, and to bind all on with a compreſs and roller: and if any cavities appear that cannot conveniently be dreſſed to the bottom, they ſhould always be laid open, or no proper foundation for healing can be obtained. The hoof alſo ſhould be kept ſupple, or pared away, when the growth of it interrupts this end, as is ſometimes the caſe. *Bartlet's Farriery, page* 244.

OUGHTS, leavings.

OUST, a kiln, generally applyed to that uſed in drying hops.

It is built with fire-places in the nature of malt-kilns; and at a proper diſtance over the fire is an hair-cloth ſtrained upon laths; and thereon the hops are laid, and raked even to the depth of about ſix or ſeven inches, for the better conveniency of drying them equally; and when they are properly cured on the under ſide, they are carefully turned; and by that means the upper ſide becoming the under, the whole ſhares the fire alike. The perſon that performs this part is called the dryer, whoſe buſineſs it is to manage the fires.

The fuel commonly made uſe of is charcoal, for its freeneſs from ſmoke, and affording a ſteady heat. Great nicety is required in this part; a ſmall fire being to be made, at firſt that they may heat gradually, and ſo raiſed as they dry, that it may be done without ſcorching; and the fire

is

s to be lowered by degrees, againſt they are ready to be taken off: the time required is about eight hours.

But as charcoal is very dear, being three or four pounds per load, many people have adopted the method of drying with ſea-coal, upon what they call cockle-ouſts, which are ſquare iron-boxes placed upon brick-work, and a flue and chimney in the back part of the building for the ſmoke to go off. The computation is, that a chaldron of ſea-coal at about twenty-four ſhillings, will dry a load of hops, and that a load of charcoal will do no more. It is indeed expenſive to erect ſuch ouſts, as there muſt be no timber near them; and an iron beam and iron-laths are to be uſed, and they covered with plates of tin or iron properly faſtened together.

A gentleman has lately claimed the merit of having invented a new method of drying hops with ſea-coal, or any kind of fuel whatever, by means of a moveable iron furnace: it is in form of an horizontal cylinder, ſtopped at both ends: it lies on an iron carriage, which rolls on four iron-wheels: in the fore-end of the cylinder is the furnace door, and a hollow iron flue runs in an horizontal direction along the upper ſurface of the cylinder from the back till it reaches the fore-end of it, when it takes a vertical direction, and is carried as high as is neceſſary to convey the ſmoke out of the ouſt. We cannot pretend to ſay what are the particular advantages reſulting from the uſe of this rolling furnace, never having ſeen it at work.

OUST-HOUSES, out-houſes, or ſuch as belong to, and are adjoining to the dwelling-houſes.

OX, the name of an animal well known, being a bull caſtrated.

Oxen, like other domeſtic animals vary in colour, tho' the dun ſeems the moſt common; and the redder it is, the more it is eſteemed. A black coat is alſo valued; and bay oxen are ſaid to be vigorous and long lived; whereas the brown ſoon decay. The grey, the dappled, and the white, are proper only for ſlaughter; no care can render them fit for labour; but whatever be the colour of an ox's coat, it ſhould be gloſſy, thick, and ſmooth to the touch; for if it be harſh, tough, or thin, there is reaſon to ſuppoſe that the animal is out of order, or at leaſt not of a ſtrong conſtitution. A good ox for the plough muſt be neither too fat nor too lean; the head ſhort and thick; the ears large and ſhaggy; the horns ſtrong, gloſſy, and of a middling ſize; the fore head wide, the eyes full and black; his muzzle large and flat; the noſtrils wide and open; the teeth white and even; the lips black, a fleſhy neck, large and heavy ſhoulders; the breaſt broad; the dew-lap hanging down to the knees; the reins very broad; a ſpacious deſcending belly; the flanks firm; the haunches large; and the rump thick; large and nervous thighs and legs; the back ſtraight and full; the tail reaching to the ground, and well covered with thick and fine hair; the feet firm; the hide thick and pliable; the muſcles raiſed; the hoof ſhort and broad; he muſt alſo anſwer to the goad, be obedient to the voice, and well trained; but it is only gradually and by beginning early, that the ox can be brought willingly to bear the yoke, and be eaſily governed. At the age of two years and a half, or three at the lateſt, you muſt begin to tame him and bring him under ſubjection if delayed longer, he becomes froward, and often ungovernable. The only method of ſucceeding is, by patience mildneſs, and even careſſes, for compulſion and ill treatment will only diſguſt him irreclaimably; ſtroaking him gently along the back, clapping him, giving him occaſionally boiled barley, ground beans, and ſuch other aliment as pleaſe him beſt, all of them mingled with ſalt, of which he is very fond, will prove of the greateſt uſe. At the ſame time his horns ſhould be often tied, and ſome day after the yoke is to be put on his neck, and faſtened to a plough, with another ox of the ſame ſize ready trained theſe are to be tied together at the manger, and in the ſame manner led to the paſture, that they may become acquainted, and accuſtomed to have one common motion. The goad is never to be made uſe of in the beginning, as that would only render him more untractable; he muſt alſo be indulged, and labour only at ſhort intervals; for till he is thoroughly trained, he tires himſelf very much; and for the ſame reaſon he is to be fed more plentifully than at other times.

An ox is to draw the plough only from his third to his tenth year, when it will be adviſeable to fatten and ſell him, as being then of a better fleſh than if he was kept longer. The age of this creature is known by his teeth and horns. The firſt fore-teeth, which he ſheds at the end of ten months, are replaced by others, larger, but not ſo white; at ſix months the teeth next to thoſe in the middle fall out, and are alſo replaced by others; and in three years all the inciſive teeth are renewed. They are then equal, long, and pretty white; but as the ox advances in years, they wear, become unequal, and black. It is the ſame in the bull and cow: ſo that the growth and ſhedding of the teeth are not affected by caſtration, or the difference of ſexes. Nor is the ſhedding of the horns affected by either; as both bull, ox, and cow, loſe them alike at the end of three years; and theſe alſo are replaced by other horns, which, like the ſecond teeth, remain; only thoſe of the ox and cow are larger and longer than thoſe of the bull. The manner of the growth of theſe ſecond horns is not uniform nor the ſhooting of them equal. The firſt year, that is the fourth year of the ox's age, two ſmall pointed horns make their appearance, nearly formed, ſmooth, and towards the head terminated by a kind of button. The following year this button moves from the head, being impelled by a corneous cylinder, which alſo lengthening, is terminated by another button, and ſo on; for the horns continue growing as long as the creature lives. Theſe buttons become annular joints, which are eaſily diſtinguiſhed in the horn, and by which the age of the creature may be readily known counting three years for the point of the horn to the firſt joint, and one year for each of the other intervals.

OX-BOOSE, an ox-ſtall, or cow-ſtall, where theſe creatures ſtand in the winter.

OX-HARROWS, very large harrows, called in ſome counties, drags.

OX-GANG, or *Ox-gate*, a quantity of land meaſuring fifteen acres, being as much ground as a ſingle ox is ſuppoſed to be capable of ploughing in a year.

P.

PACK-SADDLE, a ſaddle adapted to the carriage of heavy packs or burdens.

PAD, the road, a foot-path; alſo an eaſy paced horſe: likewiſe a low ſaddle.

PADDLE-STAFF, an inſtrument uſed by the ploughman to free the ſhare from ſtubble, clay, &c. which hinder its action.

PADDOCK, a ſmall field or incloſure. It alſo ſignifies a large frog or toad.

PAIGLE, a cowſlip.

PAIL, a wooden veſſel in which milk or water is commonly carried.

PALMS, the male flowers of the willow.

PALSY, a diſeaſe common to horſes, wherein the body or ſome of its members, loſe their motion, and ſometimes their ſenſation of feeling.

In paralytic diſorders, where the uſe of a limb or limbs is taken away, the internals (recommended under the article STAGGERS) ſhould be given in order to warm, invigorate, and attenuate the blood; and the following ſtimulating embrocation ſhould be rubbed into the parts affected.

Take oil of turpentine four ounces, nerve ointment and oil of bays, of each two ounces; camphor rubbed fine, one ounce; rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected ſhould be well bathed for a conſiderable time, to make it penetrate; and when the hind parts are chiefly lame, the back and loins ſhould be well rubbed with the ſame: to the nervous medicines above recommended, may be added ſnake-root, contrayerva, muſtard-ſeed, horſe-raddiſh root, ſteeped in ſtrong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a day alone, or two horns full may be taken after the nervous balls.

Take ſnake-root, contrayerva and velerian, of each half an ounce, muſtard-ſeed and horſe-raddiſh root ſcraped, of each two ounces, long-pepper two drams, infuſe in three pints of ſtrong beer or wine.

When the horſe is recovering from any of the above diſorders, the following alterative purge may be repeated two or three times, as it operates very gently.

Take ſuccotrine aloes one ounce; myrrh half an ounce; aſſa fœtida and gum ammoniacum, of each two drams; ſaffron one dram: make into a ball with any ſyrup.

Where a retention of dung is the cauſe of this diſorder, the great gut ſhould firſt be raked thoroughly with a ſmall hand, after which plenty of emollient oily clyſters ſhould be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their impriſoned dung. Their diet ſhould for ſome days be opening, and conſiſt chiefly of ſcalded bran, with flower of brimſtone, ſcaled barley, &c.

PANIC, a plant reſembling millet in its ſtalks, leaves, and roots; but differing in its ſpikes, or ears, which are about the thickneſs of a man's finger at their baſe, and growing taper toward their points. They are about eight or nine inches long, and cloſely ſet with a ſmall roundiſh grain, ſometimes white, ſometimes red and purple, and ſometimes yellow. It is raiſed and reaped in the ſame manner as millet, but does not require ſo much rain. This plant grows naturally in both the Indies, and is cultivated in ſeveral parts of Europe for the food of men. Cakes and bread are made of it in Germany, Italy, and the ſouthern parts of France; but it is not reckoned ſo good nouriſhment as millet; nor is the German ſort ſo much eſteemed as the Italian; though the former ripens beſt in cold countries, where it is frequently ſowed in land which will not produce better grain. It thrives moſt in a dry ſtiffiſh ſoil, ſuch as the ſides of hills, and even in ſtony ground; grows to the height of about four feet, and branches very much; for which reaſon the horſe-hoeing huſbandry is by far the fitteſt for it. The plants, if managed rightly, ſhould ſtand at leaſt eighteen inches aſunder, in rows three feet apart, that there may be room to hoe the ground between them, and to keep them clear from weeds. When grown pretty tall, they ſhould be ſupported by ſtakes, leaſt the wind break them down, and particular care muſt be taken to guard againſt birds when their ſeeds begin to ripen.

PANNAGE, the food which ſwine feed upon in woods, as acorns, and the maſt of beech. It alſo ſignifies the money taken by the king's agiſtors, for the privilege of feeding hogs in the king's foreſts.

PANNEL, a low ſaddle.

PARING *the ſole. See the article* SHOEING HORSES.

PARSNEP, the name of a plant propagated for the ſake of its roots.

Parſneps require a rich, mellow, and deep ſoil; in order that their roots, according to the bigneſs and length of which they are eſteemed, may have full room to thicken and run downward. The ſeeds of theſe plants ſhould be ſown in February or March, either alone, or with carrots, eſpecially if it be intended to draw theſe laſt very young; becauſe parſneps ſeldom ſpread much before the latter end of ſummer, by which time the carrots will, in this caſe, be gone. The practice of thoſe gardeners who ſow leeks, onions, and lettuces with their parſneps, is very wrong; becauſe ſo many different growths muſt impoveriſh one another.

The young parſneps muſt be hoed and weeded, or if they were ſown in rows, the ground between thoſe rows muſt be dug, three or four times in the ſpring, or whenever elſe many weeds appear. By the latter end of the ſummer, their leaves will cover the ground, and prevent the farther growth of weeds; ſo that they will not require any more care after that ſeaſon.

When their leaves begin to decay, their roots may be dug up for uſe: but they are ſeldom well taſted before that time; nor are they good for much late in the ſpring, after they have ſhot out again. They, therefore, who would preſerve them for ſpring uſe, ſhould dig them up in the beginning of February, and bury them in ſand in a dry place, where they will remain good until the middle of April or later.

To ſave the ſeeds of this plant in the moſt advantageous way, ſome of the longeſt, ſtraiteſt, and largeſt roots, ſhould be ſingled out, and planted about two feet aſunder, in a place where they will be defended from the ſtrong ſouth and weſt winds: for the ſtems of the parſneps generally grow to a great height, and are very apt to be broken by ſtrong guſts of wind, if they are expoſed thereto. This ground ſhould alſo be kept clear from weeds; and if the ſeaſon ſhould prove dry, watering of theſe plants moderately, twice a week, will increaſe the quantity, and improve the quality, of their ſeeds, which will be ripe about the end of Auguſt or beginning of September, when the heads ſhould be carefully cut off, and ſpread upon a coarſe cloth for two or three days, to dry. The ſeeds ſhould then be beaten off, and put up for uſe. But neither theſe nor carrot-ſeeds, ſhould be depended on after they are above a year old.

Parſneps are an excellent, wholeſome, and very nouriſhing food for cattle. Their culture, as I have juſt obſerved, is exactly the ſame as that of carrots, with which they may therefore be ſown in the ſame ground. Their leaves will decay at nearly the ſame time, when the roots may be dug up, and laid by for uſe, likewiſe buried in dry ſand, in a dry place.

Parſnep-ſeeds ſeldom grow after they are above a year old.

It has long been a cuſtom in ſome parts of Britany, to ſow parſneps in the open field for the food of cattle; as we are informed by the firſt volume of the tranſactions of a Society inſtituted in that province, for the encouragement of the oeconomical and commercial intereſts of their country. "It is of great importance," ſay they, "that parſneps ſhould be univerſally cultivated; becauſe they afford an excellent and wholeſome food for all kinds of cattle, during the winter, and may be uſed to great advantage to fatten them. Our hogs have no other food in all that ſeaſon, and our bullocks and oxen thrive well upon it. Our cows fed with parſneps give more milk than with any other winter fodder, and that milk yields better butter than the milk of cows nouriſhed with any other ſubſtance. Our horſes fatten with this food: though ſome pretend that it renders them leſs mettleſome, and hurts their legs and eyes.

"Cattle eat theſe roots raw at firſt, ſliced lengthwiſe; and when they begin not to reliſh them, they are cut in pieces, put into a large copper, preſſed down there, and boiled with only ſo much water as fills up the chaſms between them. They then eat them very greedily, and continue to like them."

PARTERRE, a level diviſion of ground, which, for the moſt part, faces the ſouth and beſt front of the houſe, and is generally furniſhed with greens, flowers, &c.

There are ſeveral ſorts of parterres, as plain graſs with borders, and parterres of embroidery, &c.

Plain parterres are more beautiful in England than in any other country, by reaſon of the excellency of our turf, and that decency and unaffected ſimplicity that it affords to the eye of the ſpectator. Other parterres are cut into ſhell and ſcroll work, with ſand alleys between them which ſort of parterres are eſteemed fineſt in France.

As to the general proportion of parterres, an oblong, or long-ſquare, is eſteemed the beſt: therefore, a parterre ſhould not be leſs than twice as long as it is broad; twice and a half is accounted a very good proportion; and it is very rare that three times is exceeded. As to the breadth of a parterre, it is to take its dimenſions from the breadth of the front of the houſe; if the front of the houſe is one hundred feet long, the breath of the parterre ſhould be one hundred and fifty feet; and if the front of the houſe be two hundred feet, the parterre ſhould be fifty feet broader: but where the front exceeds the breadth of this parterre, it will be a good proportion to make the parterre of the ſame dimenſions with the front.

There ſhould be a terrace-walk on each ſide of the parterre, for an elevation proper for view; and therefore, there ſhould never be the flat of a parterre between terrace-walk and terrace-walk, above three hundred feet; nor can it be well made leſs than one hundred and forty. As to the adorning and furniſhing theſe parterres, whether it be plain or with embroidery, that depends much upon the form of them, and therefore muſt be left to the judgment and fancy of the deſigner.

PARTRIDGE, a timorous and ſimple bird, and is ſo valuable at the table, that there are a great many ways of taking it invented by the ſportſmen, all of which ſucceed from the folly and fear of the animal.

The places that partridges moſt delight in, are corn fields, eſpecially while the corn grows; for that is a ſafe retreat, where they remain undiſturbed, and under which they uſually breed. They frequent the ſame fields after the corn is cut down, and that with another intent; for they then feed on the corn that has fallen from the ears, and find a ſufficient ſhelter for them under covert of the ſtalks, eſpecially of thoſe of wheat ſtubble. When the wheat ſtubble is much trodden by men or beaſt, they retire to the barley ſtubble, and will there hide themſelves in coveys of twenty or thirty. When the winter comes on, and the ſtubble fields are trodden down or ploughed up, they then retire to the upland meadows, where they lodge in the high graſs, and among ruſhes; ſometimes they reſort

ſort to the low coppice woods, eſpecially if there be corn lands near them.

PASTURE, or *Paſture Land*, a general name for all ſorts of land reſerved for the purpoſes of feeding cattle.

Paſture ground is of two ſorts: the one is low meadow land, which is often over-flowed; and the other is upland, which lies high and dry. The firſt of theſe will produce a much greater quantity of hay than the latter, and will not require manuring or dreſſing ſo often: but then the hay produced on the upland is much preferable to the other; as is alſo the meat which is fed in the upland more valued than that which is fatted in rich meadow: though the latter will make the fatter and larger cattle, as is ſeen by thoſe which are brought from the low rich lands in Lincolnſhire. But where people are nice in their meat, they will give a much larger price for ſuch as hath been fed on the downs, or in ſhort upland paſture, than for the other, which is much larger. Beſides this, dry paſtures have an advantage over the meadows, that they may be fed all the winter, and are not ſo ſubject to poach in wet weather; nor will there be ſo many bad weeds produced; which are great advantages, and do, in a great meaſure, recompenſe for the ſmallneſs of the crop.

We have already mentioned the advantages of meadow land, or ſuch as is capable of being overflowed with water, and given directions for draining and improving low paſture land, under the article LAND; therefore ſhall not repeat that here, but juſt mention ſome methods for improving of upland paſture.

The firſt improvement of upland paſture is, by fencing it, and dividing it into ſmall fields of four, five, ſix, eight, or ten acres each, planting timber trees in the hedge-rows, which will ſcreen the graſs from the dry pinching winds of March, which will prevent the graſs from growing in large open lands; ſo that, if April proves a dry month, the land produces very little hay; whereas in the ſheltered fields the graſs will begin to grow early in March, and will cover the ground, and prevent the ſun from parching the roots of the graſs, whereby it will keep growing, ſo as to afford a tolerable crop, if the ſpring ſhould prove dry. But, in fencing of land, it muſt be obſerved, as was before directed, not to make the incloſures too ſmall, eſpecially where the hedge-rows are planted with trees; becauſe, when the trees are advanced to a conſiderable height, they will ſpread over the land; and, where they are cloſe, will render the graſs ſour; ſo that, inſtead of being of an advantage, it will greatly injure the paſture.

The next improvement of upland paſture is, to make the turf good, where, either from the badneſs of the ſoil, or for want of proper care, the graſs hath been deſtroyed by ruſhes, buſhes, or mole-hills. Where the ſurface of the land is clayey and cold, it may be improved by paring it off, and burning it in the manner before directed: but, if it is an hot ſandy land, then chalk, lime, marle, or clay, are very proper manures to lay upon it: but this ſhould be laid in pretty good quanties, otherwiſe it will be of little ſervice to the land.

If the ground is over-run with buſhes or ruſhes, it will be a great advantage to the land to grub them up towards the latter part of ſummer; and after they are dried to burn them, and ſpread the aſhes over the ground juſt before the autumnal rains; at which time the ſurface of the land ſhould be levelled, and ſown with graſs-ſeed, which will come up in a ſhort time, and make good graſs the following ſpring. So, alſo, when the land is full of mole hills, theſe ſhould be pared off, and either burnt for the aſhes, or ſpread immediately on the ground, when they are pared off, obſerving to ſow the bare patches with graſs ſeed, juſt as the autumnal rains begin.

Where the land has been thus managed, it will be of great ſervice to roll the turf, in the months of February and March, with an heavy wood roller; always obſerving to do it in moiſt weather, that the roll may make an impreſſion: this will render the ſurface level, and make it much eaſier to mow the graſs, than when the ground lies in hills; and will alſo cauſe the turf to thicken, ſo as to have what the people uſually term a good bottom. The graſs, likewiſe, will be the ſweeter for this huſbandry, and it will be a great help to deſtroy bad weeds.

Another improvement of upland paſtures is, the feeding of them: for where this is not practiſed, the land muſt be manured at leaſt every third year; and where a farmer hath much arable land in his poſſeſſion, he will not care to part with his manure to the paſture. Therefore every farmer ſhould endeavour to proportion his paſture to his arable land, eſpecially where manure is ſcarce, otherwiſe he will ſoon find his error; for the paſture is the foundation of all the profit which may ariſe from the arable land.

Whenever the upland paſtures are mended by manure, there ſhould be a regard had to the nature of the ſoil, and a proper ſort of manure applied: as for inſtance, all hot ſandy land ſhould have a cold manure; neat's dung and ſwine's dung are very proper for ſuch lands; but, for cold lands, horſe-dung, aſhes, and other warm manures, are proper. And when theſe are applied, it ſhould be done in autum, before the rains have ſoaked the ground, and rendered it too ſoft to cart on; and it ſhould be carefully ſpread, breaking all the clods as ſmall as poſſible, and then harrowed with buſhes, to let it down to the roots of the graſs. When the manure is laid on at this ſeaſon, the rains in winter will waſh down the ſalts, ſo that the following ſpring the graſs will receive the advantage of it.

There ſhould alſo be great care had to the deſtroying of weeds in the paſture every ſpring and autumn; for, where this is not practiſed, the weeds will ripen their ſeeds, which will ſpread over the ground, and thereby fill it with ſuch a crop of weeds as will ſoon overbear the graſs, and deſtroy it; and it will be very difficult to root them out, after they have gotten ſuch poſſeſſion; eſpecially ragwort, and ſuch other weeds as have down adhering to their ſeeds.

Theſe upland paſtures ſeldom degenerate the graſs which is ſown on them, if the land is tolerably good; whereas the low meadows, which are overflowed in winter, in a few years turn to an harſh ruſhy graſs, though the upland will continue a fine ſweet graſs for many years without renewing.

There is no part of huſbandry, of which the farmers are in general more ignorant than that of the paſture: moſt of them ſuppoſe, that when old paſture is ploughed up, it can never be brought to have a good ſward again: ſo their common method of managing their land, after ploughing, is, to ſow, with their crop of barley, ſome graſs ſeeds, as they call them; that is, either the red clover, which they intend to ſtand two years after the corn is taken off the ground, or rye graſs, mixed with trefoil: but as all theſe are, at moſt, but biennial plants, whoſe roots decay ſoon after their ſeeds are perfected; ſo, the ground, having, no crop upon it, is again ploughed for corn: and this is the

conſtant round which the lands are employed in, by the better ſort of farmers; for I never have met with one of them who had the leaſt notion of laying down their land to graſs for any longer continuance; therefore, the ſeeds which they uſually ſow, are the beſt adapted for this purpoſe.

But, whatever may have been the practice of theſe people, I hope to prove, that it is poſſible to lay down land, which has been in tillage, with graſs, in ſuch a manner, as that the ſward ſhall be as good, if not better, than any natural graſs, and of as long duration. But this is never to be expected, in the common method of ſowing a crop of corn with the graſs ſeeds: for, wherever this has been practiſed, if the corn has ſucceeded well, the graſs has been very poor and weak; ſo that, if the land has not been very good, the graſs has ſcarcely been worth ſaving: for the following year it has produced but little hay, and the year after the crop is worth little, either to mow or feed. Nor can it be expected to be otherwiſe; for the ground cannot nouriſh two crops: and, if there were no deficiency in the land, yet the corn, being the firſt, and moſt vigorous of growth, will keep the graſs from making any conſiderable progreſs; ſo that the plants will be extremely weak, and but very thin, many of them which came up in the ſpring, being deſtroyed by the corn; for, whenever there are roots of corn, it cannot be expected there ſhould be any graſs. Therefore the graſs muſt be thin, and, if the land is not in good heart, to ſupply the graſs with nouriſhment, that the roots may branch out after the corn is gone, there cannot be any conſiderable crop of clover: and, as their roots are biennial, many of the ſtrongeſt plants will periſh ſoon after they are cut; and the weak plants, which had made but little progreſs before, will be the principal part of the crop for the ſucceeding year: which is many times not worth ſtanding.

Therefore, when ground is laid down for graſs, there ſhould be no crop of any kind ſown with the ſeeds; and the land ſhould be well ploughed, and cleaned from weeds; otherwiſe the weeds will come up the firſt, and grow ſo ſtrong, as to overbear the graſs, and, if they are not pulled up, will entirely ſpoil it. The beſt ſeaſon to ſow the graſs ſeeds upon dry land is about the middle of September, or ſooner, if there is an appearance of rain: for the ground being then warm, if there happen ſome good ſhowers of rain after the ſeed is ſown, the graſs will ſoon make its appearance, and get ſufficient rooting in the ground before winter; ſo will not be in danger of having the roots turned out of the ground by froſt, eſpecially if the ground is well rolled before the froſt comes on, which will preſs it down, and fix the earth cloſe to the roots. Where this hath not been practiſed, the froſt has often looſened the ground ſo much, as to let in the air to the roots of the graſs, and done it great damage; and this has been brought as an objection to the autumnal ſowing of graſs: but it will be found to have no weight, if the above direction is practiſed: nor is there any hazard of ſowing the graſs at this ſeaſon, but that of dry weather, after the ſeeds are ſown; for, if the graſs comes up well, and the ground is well rolled in the end of October, or the begining of November, and repeated again the beginning of March, the ſward will be cloſely joined at bottom, and a good crop of hay may be expected the ſame ſummer. But, where the ground cannot be prepared for ſowing at that ſeaſon, it may be performed the middle or latter end of March, according to the ſeaſon's being early or late; for, in backward ſprings, and in cold land, we have often ſowed the graſs in the middle of April, with ſucceſs: but there is danger, in ſowing late, of dry weather, and eſpecially if the land is light and dry; for we have ſeen, many times, the whole ſurface of the ground removed by ſtrong winds at that ſeaſon; ſo that the ſeeds have been driven in heaps to one ſide of the field. Therefore, whenever the ſeeds are ſown late in the ſpring, it will be proper to roll the ground well ſoon after the ſeeds are ſown, to ſettle the ſurface, and prevent its being removed.

The ſorts of ſeeds which are the beſt for this purpoſe, are, the beſt ſort of upland hay-ſeeds, taken from the cleaneſt paſtures, where there are no bad weeds: if this ſeed is ſifted to clean it from rubbiſh, three buſhels will be ſufficient to ſow an acre of land. The other ſort is the *trifolium pratenſe album*, which is commonly known by the names white Dutch clover, or white honeyſuckle graſs. Eight pounds of this ſeed will be enough for one acre of land. The graſs ſeed ſhould be ſown firſt, and then the Dutch clover-ſeed may be afterwards ſown: but they ſhould not be mixed together; becauſe the clover-ſeeds, being the heavieſt, will fall to the bottom, and conſequently the ground will be unequally ſown.

When the ſeeds are come up, if the land ſhould produce many weeds, theſe ſhould be drawn out before they grow ſo tall as to overbear the graſs: for where this has been neglected, the weeds have taken ſuch poſſeſſion of the ground, as to keep down the graſs, and ſtarve it; and, when theſe weeds have been ſuffered to remain until they have ſhed their ſeeds, the land has been ſo plentifully ſtocked with them, as intirely to deſtroy the graſs: therefore it is one of the principal parts of huſbandry, never to ſuffer weeds to grow on the land.

If the ground is rolled two or three times, at proper diſtances after the graſs is up, it will preſs down the graſs, and cauſe it to make a thicker bottom: for, as the Dutch clover will put out roots from every joint of the branches which are near the ground, ſo, by preſſing down of the ſtalks, the roots will mat ſo cloſely together, as to form a ſward ſo thick as to cover the whole ſurface of the ground, and form a green carpet; and will better reſiſt the drought. For, if we do but examine the common paſtures in ſummer, in moſt of which there are patches of this white honeyſuckle graſs growing naturally, we ſhall find theſe patches to be the only verdure remaining in the fields. And this, the farmers in general acknowledge, is the ſweeteſt feed for all ſorts of cattle; yet never had any notion of propagating it by ſeeds: nor has this been long practiſed in England; for, till within a few years that ſome curious perſons imported the ſeed from Brabant, where it had been long cultivated, there was not any of the ſeeds ſaved in England: though now there are ſeveral perſons who ſave the ſeeds here, which ſucceed full as well as any of the foreign ſeeds which are imported.

As the white clover is an abiding plant, ſo it is certainly the very beſt ſort to ſow, where paſtures are laid down to remain: for as the hay ſeeds which are taken from the beſt paſtures, will be compoſed of various ſorts of graſs, ſome of which may be but annual, and others biennial; ſo, when thoſe go off, there will be many and large patches of ground left bare and naked, if there is not a ſufficient quantity of the white clover, to ſpread over and cover the land. Therefore, a good ſward can never be expected, where this is not ſown: for in moſt of the natu-

ral paſtures we find this plant makes no ſmall ſhare of the ſward; and it is equally good for wet and dry land, growing naturally upon gravel and clay, in moſt parts of England: which is a plain indication how eaſily this plant may be cultivated, to great advantage, in moſt ſorts of land throughout the kingdom.

Therefore, the true cauſe why the land which has been in tillage, is not brought to a good turf again, in the uſual method of huſbandry, is, from the farmers not diſtinguiſhing which graſſes are annual from thoſe which are perennial: for, if annual or biennial graſſes are ſown, theſe will of courſe ſoon decay; ſo that, unleſs where ſome of their ſeeds may have ripened and fallen, nothing can be expected on the land but what will naturally come up. Therefore this, with the covetous method of laying down the ground with a crop of corn, has occaſioned the general failure of increaſing the paſture in many parts of England, where it is now much more valuable than any arable land.

After the ground has been ſown in the manner before directed, and brought to a good ſward, the way to preſerve it good is, by conſtantly rolling the ground with an heavy roller, every ſpring and autumn, as hath been before directed. This piece of huſbandry is rarely practiſed by farmers: but thoſe who do, find their account in it; for it is of great benefit to the graſs. Another thing ſhould alſo be carefully performed; which is, to cut up docks, dandelion, knapweed, and all ſuch bad weeds, by their roots every ſpring and autumn: this will increaſe the quantity of good graſs; and preſerve the paſtures in beauty. Dreſſing of theſe paſtures every third year is alſo a good piece of huſbandry; for otherwiſe it cannot be expected the ground ſhould continue to produce good crops. Beſides this, it will be neceſſary to change the ſeaſons of mowing, and not to mow the ſame ground every year; but to mow one ſeaſon and feed the next: for, where the ground is every year mown, it muſt be conſtantly dreſſed, as are moſt of the graſs grounds near London, otherwiſe the ground will be ſoon exhauſted. *Miller's Gard. Dict.* See the article MEADOW.

The following Methods of improving wet Paſtures, will, we doubt not, be very acceptable to our Readers, as they are founded on Experience, and conſequently have no tendency to deceive the Huſbandman.

"As I have, ſays our ingenious huſbandman, within a few years, not only had ſome experience in my own farm, but obſerved the methods employed by many neighbouring gentlemen and farmers in mending their paſtures, I ſhall communicate a few of my remarks to you on the improvement of wet paſtures; a ſubject which may prove, perhaps, of ſome little utility, as I ſhall ſpeak of nothing but what I have either performed myſelf, or ſeen hereabouts.

"The particular lands of which I ſpeak are looſe, woodcock, brick earth ſoils for about eighteen or twenty inches, and under that, clay to a great depth.

"Some that I have improved myſelf were exactly level, ſo as to be quite poiſoned with the wet, which could not drain off.

"From the beſt obſervations I could make on many experiments, the following is the method which anſwers beſt to improve them. I ſhall alſo give you the expence with us.

"The firſt thing to be done is, to make large, deep ditches round every field, and, if the fields are large, to divide them into ſmaller, of five, ſix, or ſeven acres each, by new ditches; nothing is attended with a more ſudden improvement of all the ground near the borders of the fields, than good ditches.

"I generally make mine ſix feet perpendicular deep, ſeven wide at top, and three at the bottom. I never pay for them by the rod (which is cuſtomary) but give twopence halfpenny per load, of thirty buſhels, for all the clay, &c. that is thrown out of them, and two ſhillings and ſixpence a ſcore loads for filling and ſpreading it.

"Theſe ditches ſhould be made in ſuch a manner that no water can remain in them, but a deſcent from one to another to carry it quickly off.

"It may be eaſily imagined how much theſe muſt drain the land, beſides the quantity of excellent manure (clay) which ariſes out of them. Add to this the great convenience of having ſuch fences about a farm, that the farmar is ſure to find his cattle wherever he turns them, inſtead of their breaking perpetually into his corn or hay fields, which, in multitudes of farms, is ſo often the caſe: it is ſometimes the work of a boy, only to be hunting after hogs and ſheep that go aſtray for want of good fences.

"In the banks of new ditches we always lay white thorn, fifty roots to a rod (the workmen are allowed ſixpence per hundred for gathering them;) but I always avoid intermixing any thing with it, eſpecially haſel, for in the nut ſeaſon fences are pulled in pieces for the fruit by all the boys and girls in the neighbourhood; and oak, aſh, &c. only give an opportunity to get over the hedges with greater eaſe. Sallow, willow, elder, &c. are to be avoided in the hedge, or by way of hedge ſtake for the dead hedge, as they grow ſo faſt as quite to overſhadow the quick, and even deſtroy it. After frequent cuttings, to render the plants thick and ſtrong, I keep the quick regularly clipped, which, in a few years, render the fence impenetrable to man or beaſt, conſidering the largeneſs of the ditch.

"If an old fence is grown bad and thin, or compoſed of improper plants, I never yet obſerved it improved by planting quick in the gaps: the beſt way is, to reverſe the bank, and plant freſh quick.

"One advantage ariſing from good fences is not apparent at firſt ſight. To the diſgrace be it ſpoken of moſt of the gentlemen of large fortunes round Bury, the game is wretchedly deſtroyed by poachers, who take it with night-nets. Theſe vermin, who are generally labourers, ſwarm in every village round me. Their method is this: they take the farmer's horſes out of his fields, and, after their doing a hard day's work, ride them all night, as faſt as they can make them go, over the ſtubbles, to catch the patridges, blundering over every hedge (except ſuch as I have deſcribed) in their way, oftentimes ſtaking the horſes (of which two inſtances have I ſeen this ſeaſon) making gaps in the fences, riding over ſtanding corn, clover for ſeed, or any thing that is a cover for birds, and after damaging the farmer in a moſt ſhameful manner, carry the produce of their infamous labour to many, who, to their great diſhonour, encourage theſe raſcals for their convenience. The money they get is ſpent at the next alehouſe, and inſtead of doing the farmer a good day's work, they are drunk, aſleep, or idle, the whole day.

"Now

" Now there are very few farmers horſes that will leap a gate; but moſt will plunge through ſuch hedges as are common hereabouts: none could paſs ſuch ditches as I always make and recommend. A farmer in this pariſh has ſo effectually fenced in his fields with prodigious ditches, that I have heard him declare, that not a ſingle night-netter has been on his grounds on horſe-back; and were they to attempt it, they would loſe more time in paſſing one ditch than was neceſſary to drag ſome whole farms.

" The pernicious effects, to farmers, of this abominable practice, are notorious, and cry aloud for redreſs: if they would eaſe themſelves, I know of no way but ſuch ditches as I have deſcribed.

" But to return.

" When the ditching is done, the next work is to land-drain the whole fields in ſuch a manner that every part of them may be laid dry. In a paſture of ſix acres I did two hundred rod. If there is the leaſt fall in any part, or any place more wet than others, the drains ſhould be cut through them. If the ſurface is exactly level, the depth of the drains ſhould vary, ſo that the water may every where have a deſcent.

" Theſe drains are made, in general, thirty-two inches deep, twenty inches wide at the top, and four wide at the bottom. They are filled eight inches deep with either ſtones or wood; but I ſhould ever recommend the former, as the moſt effectual and laſting, to thoſe who are not deſirous of ſaving the difference of the expence. However, I know many fields in this pariſh and neighbourhood that are drained with wood, and which anſwer extremely well; and I have been aſſured that they will laſt twenty or thirty years. Nay, in ſome parts of Eſſex I hear they do it with ſtraw alone; but this muſt be of ſervice for only a few years: if ſtone be uſed, there can be no doubt of its laſting. The labour of the whole is three-pence per rod; ſometimes it is done for two-pence halfpenny.

" If with ſtone of the farmers, a load of thirty buſhels will do three rods, which coſts one ſhilling and a halfpenny ſtubbing and picking; ſo the expence of a rod is ſeven-pence, beſides carriage of the ſtone, which will not be much: but if he buys his ſtone, as is much the moſt probable in this country, we may ſuppoſe he muſt go two miles to fetch it, and give a ſhilling for eighteen buſhels ready picked: the carriage is worth a ſhilling more, and reckoning the eighteen buſhels to do a rod and half (which is near the matter) the ſtone of it will coſt per rod one ſhilling and four-pence.

" If buſhes are uſed, a load of forty faggots will coſt if he buys them, or be worth if he has them, five ſhillings, and coſt cutting one ſhilling. They will do ten rods; ſo that the whole expence of doing a rod with them will be ten-pence, and of ſtone one ſhilling and ſeven-pence.

" The very firſt year the prodigious advantage of theſe drains appears, eſpecially if the ſeaſon proves wet. The graſs (or corn if in ploughed fields, for it anſwers in all) will be freſh, vigorous, and ſweet, wherever the paſtures are drained.

" I have a field of ſix acres (mentioned above) which by land-draining, ditching, and manuring, is an exceeding good paſture, and has produced two tons and ten hundred weight of hay per acre, in a very good year, and generally thirty-five hundred weight per acre; whereas the paſtures adjoining are ſcarce worth the farming, and let but at ſeven ſhillings per acre, producing ſcarce any thing but a little feed for lean cattle. The ſoil is the ſame in both; the ſix acres, about twelve years ago, being full as bad as the reſt.

" Theſe are the principal points to be obſerved in improving ſuch wet, cold, looſe, paſtures as I have deſcribed: ſome that I have quite changed by theſe means were half over-run with moſs and ruſhes; but draining them thoroughly, and claying them, kills all rubbiſh of this ſort, and preſents the farmer with ſo admirable a view of good paſture for dairy or grazing, where ſo lately nothing could live, as to be equalled in ſcarce any thing of the kind.

" But as all improvement ceaſes to be ſuch when more money is ſpent in it than the advantages will repay, I ſhall in a few words diſplay how far this is from being the caſe here. I will ſuppoſe two or three fields are improved by claying and draining, amounting in the whole to twenty acres.

	l.	s.	d.
" Sixty loads of clay per acre thrown out of the ditches, twelve hundred loads, at two-pence halfpenny per load	12	0	0
" I will ſuppoſe ſixty rod of new ditching done, which before clay is thrown out by the load, will coſt one ſhilling per rod	3	0	0
" Three thouſand quickſets, at ſixpence per hundred	0	15	0
" Land-draining ſeven hundred rod with buſhes (this is the quantity I have now marked out in a field of twenty acres) at ten-pence per rod	29	3	4
" N. B. I had a great part of my laſt crop of barley killed in this field with the wet: I had therefore a fine opportunity of marking exactly where the drains ſhould be made, which ought, on ſuch occaſions, never to be omitted, were it only for the common water-furrows which are made for every crop. In ſome fields, unleſs ſuch a guide offers, it is very difficult to tell exactly where to make the land-drains.			
" Turning and mixing one thouſand ſix hundred load of manure	6	8	0
" Filling and ſpreading one thouſand ſix hundred loads, at two ſhillings and ſixpence per ſcore	10	0	0
" I will ſuppoſe that the work may be done the ſooner if the farmer brings one hundred loads of the four hundred of dung from the neareſt town; and as I have not reckoned the horſes and driver for the clay cart, I ſhall not in the bringing the dung: therefore the expences per waggon load will be, the coſt three ſhillings, boy ſixpence, and turnpike ſixpence. A waggon load is two tumbrel loads (in this country) ſo fifty loads, at four ſhillings, are	10	0	0
Total	71	6	4

" This

" This is three pounds eleven ſhillings and three-pence per acre: and ſuppoſing the profit to laſt but twenty years, although the draining and ditching part will laſt twice that time, and the clay five and twenty as good as at firſt; and the farmers hereabouts ſeldom change their farms, if tolerable ones, living in them their lives, and their ſons after them, with leaſes of ſeventeen, twenty-one, and twenty-five years: ſuppoſing twenty years profit, I ſay, the expences will then be, per acre per annum, three ſhillings and ſixpence halfpenny.

" So ſmall is the expence divided. But now let us conſider the profit.

" Such land as I have deſcribed never lets here for more than ten ſhillings per acre, by far oftener for eight ſhillings, or eight and ſixpence; and it is from my own experience, as well as various obſervations, that I aſſert the ſame land, after the improvements, will let to any tenant for ſeventeen, eighteen, and twenty ſhillings per acre.

" I will ſuppoſe it only ſixteen ſhillings, though I am certain that is conſiderably under the mark: he then gains, in point of rent, ſix ſhillings per acre; and the whole calculation is abſurd, if we do not add his whole proportional profit on the acre: ſuppoſing his profit on it before improvement was a rent, ten ſhillings; afterwards, it will undoubtedly be the ſame at leaſt; which adds ſix ſhillings more to the profit; ſo that the whole will be twelve ſhillings per acre per annum, or eight ſhillings and ſixpence clear, after the improvement is paid.

	l.
" Twelve ſhillings per acre is per annum, for twenty years	240
" Expences of improvement	71
" Clear profit	169

" Or eight pounds nine ſhillings per annum: and if we reckon five per cent. intereſt for the ſeventy one pounds, that is, three pounds eleven ſhillings per annum, which, deducted from eight pounds nine ſhillings, leaves four pounds eighteen ſhillings per annum abſolute profit.

" Thus, I think, I have ſtated the caſe of this improvement clearly; and I muſt repeat it, that I ſpeak from experience. The ſum to be expended on twenty acres will appear large to moſt farmers, whoſe property is not conſiderable, but the proportion holds for a ſingle acre, and thoſe who cannot afford to improve twenty, may three, four, or five; and I make no doubt but ſuch as attempt it will find their account in it greater than I have ſtated it.

" As I have mentioned a tumbrel-load to be thirty buſhels, and a waggon load to be but two tumbrels, I ſhould obſerve that we carry away of muck fifty buſhels at a time in our tumbrels, and ſo agree with our men in proportion to the thirty buſhel loads.

" I have obſerved, that in making new ditches, or enlarging old ones, I never pay by the rod, but by the load: however, to thoſe who chuſe the former way, I would recommend that they have them worked by a frame of ſmall ſlit deal, nailed into the exact ſize of the intended ditch, and agree with the workmen to do their work by it: this will prevent diſputes which frequently ariſe."

PATE, a brock or badger.

PEASE, a genus of plants cultivated in every part of England both in the field and kitchen-garden. We ſhall here give the beſt inſtructions in our power for obtaining large crops in the field.

Mr. Liſle, for the greater eaſe and more certain guidance of country people, who are apt to be perplexed by a long liſt of particular names of different ſorts of field-peas, and of their ſeveral numerous varieties, judiciouſly ranges them under two general heads, viz. the tender and the hardy ſmall ſort, and the tender and the hardy great ſort; under the one or the other of which claſſes he thinks all kind of peas may properly be ranked, becauſe they equally agree or diſagree with the ſame ſoil. The tender pea, for example, is improper for a cold country, or, which amounts to the ſame, for cold ground in a warm country; and the large pea, by reaſon of its great haulm, is not proper for ſtrong rich land, becauſe its haulm will there increaſe to ſo great a length, that it will not be able to bear pods. His own experience in the year 1704, ſatisfied him fully that the beſt way to make peas pod well, is to ſow them on a mellow mould, rendered light by plowing: and he thinks it right to roll the ground ſoon after they are ſown.

Even the moſt general directions cannot but be of ſervice to the huſbandman: but more particular obſervations and actual experiments properly diverſified, are ſtill much wanted in the culture of this, and indeed of all other podded grains, and ſucculent plants, whoſe importance, as deſtroyers of weeds, improvers of land, and excellent preparers of it for other crops, is eſtabliſhed beyond diſpute. It is even a rule with farmers, not to ſow the ſame land a ſecond time with peas, till ſix, or at leaſt five years after the former crop of the ſame kind; becauſe, till then, the ground on which they grew will continue ſo rich as to make them run luxuriantly to haulm, in a manner inconſiſtent with the bearing of much fruit.

The common white pea does beſt on light ſandy land, or on a rich looſe ſoil. It is generally ſown with a broad caſt, and only harrowed in. Three buſhels of theſe peas are the uſual allowance of ſeed for an acre of ground; and the common time for ſowing them is about the latter end of March, or the beginning of April, on warm land: but a fortnight or three weeks later than this, will be early enough on cold ground. If ſown in drills, which is by far the beſt way, a buſhel and a half of ſeed will be full enough for an acre; and, when they are thus ſet regularly, the ground may be ſtirred with a hoe, to deſtroy the weeds, and earth up the plants, by which they will be greatly improved, and the peas will be much eaſier to cut in autumn, when they are ripe.

The green and the maple rouncivals require a ſtronger ſoil than the white, and ſhould be ſown a little later in the ſpring, alſo in drills, but farther aſunder, that is to ſay, at the diſtance of at leaſt two feet and a half, or three feet from each other, becauſe they are apt to grow rank, eſpecially in a wet ſeaſon. The ground between theſe rows ſhould be ſtirred two or three times with a hoe, which will not only deſtroy the weeds, but, by earthing up the peas, will greatly improve them, and alſo render the land fitter to receive whatever crop is put on it the following ſeaſon.

The gray and other large winter peas, as they are called, are ſeldom cultivated in gardens, becauſe they require a great deal of room. The beſt time for ſowing of theſe is about the beginning of March, when the weather is pretty dry; for if they are ſown in a very wet ſeaſon, they are apt to rot, eſpecially if the ground be cold. The diſtance

between

between the rows ſhould here be at leaſt three feet, and theſe peas ſhould be ſown very thin in the rows: for if they are ſown too thick, their haulm will ſpread ſo as to fill the ground, and they will ramble over each other; by which means many of the plants will be rotted, and hindered from bearing. The common allowance of theſe large peas, is two buſhels to an acre: but that is certainly more than conſiſts with the very thin ſowing, which is beſt for them.

The grey peas, in particular, thrive beſt on a ſtrong clayey land, in which they are commonly ſown under furrow. But by this method of ſowing, large peas, eſpecially, are always planted too thick, and at unequal depths, which prevent their coming up regularly. For this reaſon, among many others, all rank-growing plants, ſhould undoubtedly be ſown in drills, in which their ſeeds will be diſtributed much more equally in all reſpects.

If only a ſmall ſpot of ground be planted with theſe peaſe, a channel about two inches deep may be made with a hoe, guided by a line, the ſeeds may be dropped therein, and the earth may be drawn over them with a rake. By this means they will be covered equally, and with tolerable diſpatch, though not ſufficient for large fields, where, for this reaſon, a ſhallow furrow is commonly made with the plough, the ſeeds are ſcattered in it, and the earth is harrowed over them. The greateſt trouble then remaining is to keep the plants clear from weeds, and lay the earth up to their roots, which, in countries where labour is dear, is very expenſive to have done with the hand-hoe, but may be eaſily effected by drawing a horſe-hoe between the rows. This will entirely eradicate the weeds, ſtir the ſoil, render it mellow, and greatly promote the proper growth of the plants.

All ſorts of peaſe love limed or marled land: but when they are ſown late in the ſeaſon, the ſoil ſhould be ſtrong and moiſt; for they will then burn up and periſh in hot light land, or at leaſt not produce a crop worth taking off the ground. The authors of the *Maiſons Ruſtiques* approve of ſteeping them twenty-four hours in water before they are ſown, as well as to ſeparate the bad and faulty from the good, as to enable theſe laſt to riſe the ſooner by being thus moiſtened. In general, the larger the pea is, and conſequently the later its uſual time of ripening, the earlier it ſhould be ſown, as experience has directed, and as Mr. Liſle rightly infers from the following curious obſervation, which, if duly attended to, may be of ſervice to huſbandmen and gardeners, and perhaps productive of ſome improvement in the culture of this plant.

In 1708, when the field and garden peaſe were near a foot high, he obſerved on the very top of them a purſe or neſt of buds of bloſſoms, lying in a bag together; and perceiving at the ſame time that there was no ſhew of bloſſoms putting forth at the lower joints, he concluded that the crops of peaſe would miſcarry that year, that they would not only have ſome top-kid, and that it would be vain to expect any on the lower joints, becauſe they are always forwarder in bloſſoming and kidding than the upper joints, and had not then the leaſt appearance of doing either. This afforded him ſome amuſements in reaſoning: but, not being ſatisfied, in a day or two after looked again into theſe upper pods or bags of bloſſoms, and upon diſſecting a number of them, found ſometimes in a ſingle one near thirty buds of bloſſoms, two or three of which ſeemed uſually to have got the ſtart of the reſt, and to be bigger in bulk, and taller; moſt of the reſt ſeemed to lie in a huddle, without making any gradations: but as he had never ſeen, excepting the crown pea (which carries all its bloſſoms in a tuft at top, like a noſegay) other peas put forth above two bloſſoms and kids at top, which ſeldom come to any good, he ſuſpected that the many bloſſoms in this pod, muſt form the ſucceſſive gradations of bloſſoming joints, ariſing from that ſtock as from a common root, and that every bloſſom ſhot forth in order, as it grew forwarder than the reſt, while the main ſtem, advancing higher and higher, left behind the ſubaltern bloſſom of a lower joint. To be clear in this, he tied ſcarlet threads juſt under ſeveral of theſe pods, that he might know them again, and, as he expected, found in four or five days time a gradation of bloſſoms ariſing from joints with lobous leaves above his ſcarlet threads, and the pod of bloſſoms ſtill advanced on to the end, leaving behind farther joints of bloſſoms, till the whole ſtock was ſpent.

From this obſervation Mr. Liſle infers, 1. That by looking into this pod, or purſe of buds, while it is yet ſo much in its infancy as only to be viewed by a magnifying glaſs, we may judge what hopes there are of a future crop, provided the ſucceeding months prove favourable: and, 2. That we may learn from thence what ſort of peaſe to adopt to every ſort of ground: "but, continues he, before I enter on this part and uſe of the above-mentioned obſervation, I muſt, for the better underſtanding thereof, premiſe, that the farmers vary in their judgment in no one point ſo much as in the nature of the pea. Several ſorts of peaſe are commonly ſown within the limits of the ſame pariſh, and each of the perſons who ſow them generally has a great prejudice to any other ſort than that which he ſows, having perhaps been diſappointed of his expected return from other peaſe, when he has ſowed them, and being, for the ſame reaſon, equally diſpoſed as readily to alter his opinion of his laſt favourite kind; for the produce of a crop of peaſe is always very uncertain. But if the farmer would conſider, from the foregoing obſervation, how early or rath-ripe a pea is, or how late in ripening, in its nature; and that (as all its ſtock or power to put forth bloſſoms lies within the foliage of one pod) the art muſt reſult from thence, ſo to ſow the peaſe, in ſuch ground, and at ſuch time, that each ſort of pea, according to its nature, may, before autumn and cold weather come to check them, ſend forth all its gradations of joints or bloſſoms, ſo that none may become abortive for want of ſummer enough to enable nature to bring her embrios to maturity, and carry the bud-bloſſoms into kids; then it is apparent (as all large peaſe ripen late, and run to great haulm or ſtalks, and ſmall peaſe have leſs haulm and ripen earlier) that the great or late ripe peaſe ſhould be ſowed as early as the climate will permit; for thereby ſuch pea will get ſo forward as to have time to put forth all its gradations of bloſſoms and kids, and to perfect them before a rainy autumn comes, and puts a ſtop to farther vegetation. Again, great peaſe ought to be ſowed on a white, or ſome mixed land, not too groſs of juice; but not on a cold clay: for the moiſture of this laſt will keep feeding the haulm, and be inconſiſtent with the main deſign of ſowing them early, which is, that they may bring all their fruit to maturity in due time. The white or mixed mould muſt be in good heart; for otherwiſe it cannot maintain a great pea. On the other hand, it is evident from hence that a pea which ripens early ſhould be ſowed in a ſtrong feeding land, becauſe ſuch land will nouriſh it more vigorouſly,

gorouſly, without danger of too great an increaſe of its haulm, which is naturally ſhort; and, notwithſtanding the coldneſs of the ſoil, there need be no doubt but that all the kids will ripen."

Moderate rains are of ſingular ſervice to peaſe while they grow, and particularly at their time of bloſſoming and filling up their pods; but a continuance of cold rain for many days, is perhaps as prejudical as too much heat or drought. The bluiſh bloom upon their leaves, and their expanding backward the two outermoſt and largeſt leaves of their bloſſoms, are undoubted ſigns of great health and vigour. Mr. Liſle is of opinion, that they neither ripen nor harden ſo well upon high grounds, as in the vallies, and conſequently that the former are not ſo fit for keeping as the latter.

Among the very few experiments on the culture of peaſe in field, the following which M. Duhamel has given, afford a pretty ſtrong conviction of the benefits which ariſe from horſe-hoeing between their rows.

In April 1753, M. de Villiers, one of that ingenious gentleman's correſpondents, ſowed a ſmall field in Champagne, with peaſe in double rows. Not being provided with a proper inſtrument to hoe the intermediate ſpaces, he made uſe of a narrow angular kind of ſhare, which ſtirred only three or four inches on the outſide of the rows. Almoſt all the peaſe in his neighbourhood were deſtroyed that year by a kind of vermin called vine-fretters. His were hurt the leaſt of any; which was probably owing to the greater vigour of the plants, or the inſects being killed by the ſtirring of the ground. By a compariſon which he made of the produce of this ſpot, he found that it yielded ſix times as much as the ſame extent of the beſt land in the ſame country. "In a good year, ſays M. Duhamel, the difference would not have been ſo great; but ſtill this experiment ſhews that plants cultivated in the new or horſe-hoeing way, are better able to reſiſt the inclemencies of the ſeaſons, and other accidents, than thoſe which are cultivated according to the old method."

The next year, M. de Villiers, being provided with M. Duhamel's drill and horſe-hoe, ſowed peaſe again in rows, in ſome places two feet, and in others two feet and a half aſunder. But this diſtance was ſo narrow that it rendered the horſe-hoeing very difficult in many places, and quite impracticable in others. He was therefore obliged to contrive other means of ſtirring the ground, in which, notwithſtanding this, his peaſe flouriſhed extremely, and yielded more than any others on the very beſt land in the ſame diſtrict.

The ſame gentleman drilled peaſe again, in 1755, in a ſtrong heavy ſoil, in which no one had ever ventured to ſow any in the common huſbandry. They grew as high as if the ground had been ever ſo fit for them, and yielded half as much again as any ſown in the common way, beſides the ſaving in the ſeed, which in peaſe thus drilled is about one half. They were ſown in double rows, with a ſpace about two feet and a half wide between the outmoſt rows of one range and the next outmoſt row of another, and this ſpace was ſtirred with the horſe-hoe.

When any particular ſorts of peaſe are intended for ſeed, they ſhould be carefully looked over whilſt in flower, in order to draw out all ſuch plants as are not of the right ſort; for there will always be, in every ſort, ſome roguiſh plants, as the gardeners term them, which, if left to mix, will degenerate the kind. As many rows as may be thought ſufficient to furniſh the deſired quantity of ſeed, ſhould then be marked out, and left till their pods turn brown and begin to ſplit, when they ſhould immediately be gathered up, with the haulm; and if the huſbandman has not room to ſtack them till winter, they may be threſhed out as ſoon as they are dry, and put up in ſacks for uſe: but particular care ſhould be taken not to let theſe remain too long abroad after they are ripe, becauſe wet would rot them, and heat, after a ſhower of rain, would make their pods burſt in ſuch a manner that the greater part of their ſeeds would be loſt.

When the peaſe are reaped, or hacked, as they call it in ſome parts of England, they are laid up in ſmall wads, and left in the field till the haulm and pods are dry: but during this time they ſhould be frequently turned, and raiſed as much as poſſible from the earth, that they may lie hollow for the wind to dry them, eſpecially when any rain happens to wet and beat them down. In Leiceſterſhire they ſet all their peaſe abroad in ſtacks, being perſuaded that they thence acquire a much better colour, than when houſed in a barn.

An ingenious farmer has obliged the public with the following method of preparing peaſe for hog-meat; and which we ſhall here give in his own words.

"A few years ago, ſays he, I had a plentiful crop of peaſe on a ten acre piece, which lies near my houſe: when they were full podded and nearly ripe, I had them hooked in the uſual manner; but before I could get them in there came a heavy ſhower of rain, which wetted them through and through; and the dull heavy weather, with frequent ſhowers, which followed, prevented their drying for a conſiderable time.

"I cauſed the wads to be from time to time turned, to prevent the haulm from rotting; and at length a few days ſunſhine dried them enough to be inned; for as they lay hollow, the wind was greatly aſſiſtant to the operation.

"Before I got them in, on examining ſome of the pods, I found that the peaſe were all ſprouted to a conſiderable length: this was what I had expected, as I gave my crop over for loſt, till after a little recollection, as the weather ſtill continued fine, I determined to threſh them in the field.

"This was accordingly done; and the corn, after it was caſt and riddled to ſeparate it from the rubbiſh, was dried on my malt-kiln.

"When this operation was over, I began to reflect in what manner I ſhould diſpoſe of my peaſe, being ſenſible that they could not be proper for ſeed, and ſtanding no chance of diſpoſing of them to any advantage in the market.

"At length, as it was then a time of war, and of courſe there was a great demand for pork for the uſe of the navy, I determined to buy a conſiderable number of lean hogs, that I might by their means conſume this crop on my own premiſes, and in that manner make the moſt of it.

"My expectations were more than anſwered, for I found, by repeated experience, that three buſhels of the peaſe I have mentioned went nearly as far in fattening the hogs I bought, as four buſhels got in dry and hard in the manner uſually practiſed.

"This diſcovery I made ſeveral years ago, and it has turned out to my advantage, for ſince that time, I have been quite indifferent as to the weather in which my peaſe are hooked, being rather better pleaſed, as far as relates to them, with wet, than dry weather: but if the weather hap-

pens to be dry at the time they are ripe, I always cauſe as many as I want for feeding my hogs, which are not a few in a year, to be regularly malted in the ſame manner, nearly as my barley: this management has of late ſucceeded very well with me, and I therefore intend to continue it.

"Beſides feeding my hogs with theſe malted peaſe, I have beſides often given them to my horſes, with which they agree very well, and are heartening food.

"Turkeys will fatten apace on them alſo, and be fine meat.

"I have applied my malted peaſe to many other uſes, which I have not, at preſent, time to enumerate: but were they only uſed for feeding hogs and horſes, it is ſtill worth while to prepare ſome in this manner every year." *Muſeum Ruſticum, vol.* I. *page* 109.

PEASE-BOLT, peaſe haulm.

PEAT, a ſpecies of earth uſed in many countries for firing.

Under the article ASHES we have given ſome account of the uſes of thoſe made from peat; and ſhall here add the obſervations of a very intelligent huſbandman, with regard to the value of thoſe aſhes, and the ſeveral crops to which they may be profitably employed as a manure.

"The more general, ſays he, a manure is in its uſes, of ſo much the more value is it to the farmer; and, of all ſorts of manures, perhaps aſhes agree with the greateſt variety of ſoils and crops: aſhes, therefore, ſhould, one would imagine, be had in univeral requeſt, for the purpoſe of dreſſing land; but the misfortue is, no great plenty can be procured, and the few that are to be got fetch a large price: this deters the farmer for making uſe of them often as manure.

"I muſt, however, except one ſort of aſhes which are on all accounts valuable; I mean peat or turf-aſhes: theſe are, in moſt places, eaſy to be procured, coſt no great matter, and have a wonderful effect on almoſt every ſoil and crop. You may believe what I ſay, as I have had many years experience of their good qualities.

"The ſulphureous and ſaline particles with which theſe aſhes abound, have a moſt happy effect in promoting vegetation; and if uſed with diſcretion, the increaſe procured by them is truly wonderful.

"I ſuppoſe few of your readers will be at a loſs to know what peat or turf is, moſt people having ſeen a kind of it burnt as fuel.

"The ordinary peat is dug from wet bogs and moraſſes; but that which is of much ſuperior quality and virtue in its aſhes, is dug from moory wettiſh lands, which will bear cattle: as to the peat that is pared from the ſurface of heaths and commons, for firing for the poor cottagers, the aſhes of it are of very little value, when compared with thoſe above-mentioned.

"Peat is found in moſt low grounds that lie betwixt hills, eſpecially if timber has formerly ſtood upon the ſpot. It lies in various depths, being often near the ſurface, and ſometimes ſix, eight, or ten feet deep, having a ſtratum or black moory earth over it, ſuch as is the ſoil of many of our low meadows near the banks of rivers: it ſometimes even lies under a bed of gravel.

"Peat may be burnt for the ſake of procuring its aſhes for manure, all the ſummer ſeaſon: as ſoon as it is dug, ſome of it is mixed in a heap regularly diſpoſed with faggot wood, or other ready burning fuel: after a layer or two of it is mixed in this manner, peat alone is piled up to complete the heap. A heap will conſiſt of from one hundred to a thouſand loads.

"After ſetting fire to it at a proper place, before on purpoſe prepared, it is watched in the burning, and the great art is to keep in as much of the ſmoke as poſſible, provided that as much vent is left as will nouriſh and feed the fire.

"Whenever a crack appears, out of which the ſmoke eſcapes, the labourer in that place lays on more peat; and if the fire ſlackens too much within, which may eaſily be known by the heat on the outſide, the workman muſt run a ſtrong pole into the heap in as many places as is neceſſary to ſupply it with a quantity of freſh air. When managed in this manner, the work goes on as it ſhould do. It is to be noticed, that when once the fire is well kindled, the heavieſt rain does it no harm whilſt it is burning.

"Having procured a ſufficient quantity of aſhes, the farmer's next care ſhould be to apply them properly to uſe; and to do this, he muſt be well acquainted with the nature of the manure he is to lay on his land.

"All aſhes are of a hot, fiery, cauſtic nature; they muſt therefore be uſed with caution. With reſpect to peat-aſhes, almoſt the only danger proceeds from laying them on in too great quantities at improper ſeaſons.

"Nothing can be better than peat-aſhes for dreſſing low damp meadows, laying to the quantity of from fifteen to twenty Wincheſter buſhels on an acre: it is beſt to ſow them by hand, as they will then be more regularly ſpread.

"This work ſhould be done in January or February at lateſt, that the aſhes may be waſhed in towards the roots of the graſs by the firſt rains that fall in the ſpring.

"If they were ſpread more forward in the year, and a ſpeedy rain ſhould not ſucceed, being hot in their nature, they would be apt to burn up the graſs, inſtead of doing it any ſervice.

"It is to be remembered, that the damper and ſtiffer the ſoil, the more peat-aſhes ſhould be laid on it; but in graſs lands the quantity ſhould never exceed thirty Wincheſter buſhels, and on light warm lands leſs than half that quantity is fully ſufficient.

"On wheat crops theſe aſhes are of the greateſt ſervice, but they muſt be laid on with the utmoſt diſcretion. Were they to be ſpread in any quantity before the winter, after the ſowing the corn, they would make the wheat too rank, and do more harm than good; was the ſpreading this manure, on the contrary, deferred till the ſpring, the corn could not poſſibly during the winter ſeaſon be benefitted by it. After due reflection and repeated experience, my method of management in this caſe is as follows:

"About the beginning of November, before the hard froſts ſet in, I ſow on every acre of my heavy clayey wheat land about eight Wincheſter buſhels of theſe aſhes; on my lighter warmer lands in wheat, I ſow only four buſhels at this ſeaſon.

"The winter-dreſſing is, I imagine, of great ſervice: trifling as the quantity may ſeem, it warms the roots of the plants, brings it moderately forward, preſerves its verdure, and diſpoſes it to get into a growing ſtate the firſt fine weather after Chriſtmas.

"About the latter end of February, or the beginning of March, on the above-mentioned heavy lands in wheat I beſtow another dreſſing of aſhes, by ſowing of them on every acre eight buſhels more; on light lands, in this ſecond dreſſing, I allow only ſix buſhels.

"Theſe

"These ashes laid on in the spring are of the greatest service, without any probability of danger; if rain falls within a few days after the dressing is laid on, it is washed in, and has a happy effect on the succeeding crop, co-operating with the manure that was laid on in November: if, on the contrary, dry weather for a long continuance succeeds, the first winter-dressing has its full effect, and the quantity laid on in the spring is in fact so small, that there is very little probability of its burning or hurting the crop.

"This method has succeeded very well with me, and I have no reason to think it can fail with any one else.

"This excellent manure is, I find, of great use in the turnep-husbandry on many accounts, particularly as it much contributes to preserve the young crop from being devoured by the fly.

"When I sow my turneps, before I harrow in the seed, I have eight bushes of these ashes strewed by hand on every acre, and when the plants shew their first leaves above ground, I sow on every acre four bushels more: by this management my crops seldom fail, when at the same time some of my neighbours sow their turnep-land three or four times over.

"But one of the principal advantages derived from these ashes I have not yet mentioned, which is the very great service they are of to every kind of artificial pasture.

"Saintfoine receives great benefit from this manure, and so does clover, ray-grass, and trefoil, provided it is laid on with discretion: the proper season is about the month of February: the quantity must be regulated by the nature of the crop and soil; but in my opinion, it ought scarcely in any instance to exceed thirty Winchester bushels. Clover, with the help of this manure, grows with great luxuriance, insomuch that I have often had two large crops of hay from the same field in a year, and good autumn feed afterwards.

"But the effect of it is most seen in tares or vetches, and on them it is I bestow most of this manure, as they will bear it, being a very succulent plant. I had last summer a crop of tare-hay that was astonishing, by the help of these ashes, being above three large loads on an acre. The field contained six acres; it was a dryish loam, and not very rich. In the beginning of February I caused ten bushels, Winchester measure, to be strewed on each acre: immediately after the first rains had washed them in, the same quantity was in like manner spread, and about the middle of March I bestowed on each acre six bushels more for the last dressing. I am fond of dividing my entire quantities, thinking my crops are thereby less exposed to the danger of being burned, and the manure is besides more gradual and lasting in its effects.

"My tares came on amazingly, but they run chiefly to haulm, which was what I wished, not having any desire of saving the seed, but intending to make the crop in hay: my only fear was, that it would rot on the ground before it was in a proper condition to cut; but this I luckily escaped, by the soil being tolerably dry, and by the fineness of the weather. It was so heavy in the swarth, that I was obliged to pay an extraordinary price for mowing it.

"I have observed above, that I was fearful my tares would have rotted on the ground before they were fit to cut; this was owing entirely to the invigorating quality of the ashes, which by their salts, &c. promoted the growth of the plants even to luxuriance.

"Before I well knew the great fertilizing quality of these ashes, I lost, by improper management, a fine three acre piece of hog-pease. I laid on this field, soon after the pease came up, threescore Winchester bushels of these ashes at one dressing: this brought them forward a great pace, but at harvest I found, to my grief, I had scarcely any corn, for I had overdone it in laying on so much, and the pease were run all to haulm.

"Ever since this accident I have declined using them as a common dressing for my pease; and this I have been the more induced to do, as, in several little experiments I have since made, I have found it extremely difficult to apportion the several quantities which ought to be laid on various soils when sown with pease; for the quantity that has one year succeeded very well with me, has the next, owing to the difference of seasons, on the same soil, in another part of the same field, totally disappointed me; so that, for pease, I esteem it a very critical manure, therefore very cautiously to be used.

"The effects of this manure will be visible at least three years, and it does not, like some others, leave the land in an impoverished state, when its virtues are exhausted and spent.

"Peat-ashes are not so certain a manure for barley and oats as for the winter corn: for as these are quick growers, and occupy the land but a few months, this warm manure is often apt to push them forward too fast, and make them run too much to coarse straw, yielding only a lean immature grain. Oats, however, are not so apt to be damaged by it as barley.

"To get a good crop of barley, I often sow it after turneps, which have two light dressings of ashes, in the manner above described.

"When the turneps are fed off, or drawn, I give the field, if the season permits, a good ploughing: if they were fed off, the land will want no more ashes; but if they were drawn, and either carried into another ground to feed sheep, or given to my stall-fed oxen, I strew on each acre, after this ploughing, five Winchester bushels of ashes, leaving them to be washed in by the first rain. In this manner I let the land lie till I give it the second and last ploughing before it is sown. The manure has by this management the desired effect, and the barley generally produces full and heavy ears.

"When I sow my barley after turneps, I give the land only two ploughings, because the soil was before much loosened by the hoeings bestowed on the turneps; but in other cases I am fond of allowing three, and sometimes four ploughings to my lands destined for barley; and I generally find it it answer very well; for many years experience has convinced me, that upon a fine tilth barley always thrives best, and yields most: in fact, the crop is almost always governed by the condition of the land, and a well tilled soil is less exposed to danger in an untoward season.

"Peat-ashes approach, in their effects on the several crops on which they are laid, to coal-soot; but two-thirds of the quantity that is used of soot, will be sufficient of the ashes, as they are in a much stronger degree, impregnated with a vegetative power; and they are, besides, in most places easier procured in quantities, and at a cheaper rate.

"It may possibly be objected, that this manure requires great nicety in the application; I allow it does; yet every intelligent farmer, who knows the nature and qualities of the soils of his several fields, will soon be able, with

great preciſion, to judge how much he ought to lay on each acre: his chief care at firſt ſhould be not to overdo it; for therein conſiſts the principal danger; though, after all, theſe aſhes will, at the worſt, unleſs laid on in very great exceſs indeed, only occaſion the inexperienced farmer the perhaps partial loſs of a ſingle crop; for the ſucceeding year they will, in all probability, have a very ſalutary effect on the land, and ſometimes even repay the preceding loſs.

"When the error is in the exceſs, it is very eaſy for a farmer to avoid falling into it; for, independent of every other conſideration, the ſole view of leſſening his expences will, it is imagined, ſufficiently induce him to be attentive to this particular.

"When peat is burnt for the ſake of its aſhes in ſummer time, it is neceſſary that ſome care ſhould be taken to defend them from the too powerful influence of the ſun, air, dews, rains, &c. or great part of their virtue would be exhaled and exhauſted. If the quantity of aſhes procured is not very great, they may be eaſily put under cover in a barn, cart-lodge or hovel; but large quantities muſt neceſſarily, to avoid expence, be kept abroad; and when this is the caſe, they ſhould be ordered as follows.

"A dry ſpot of ground muſt be choſen; and on this the aſhes are to be laid in a large heap, as near as poſſible in the form of a cone ſtanding on its baſe, the top as ſharp pointed as poſſible: when this is done, let the whole be covered thinly over with a coat of ſoil, to defend the heap from the weather: the circumjacent earth, provided it is not too light and crumbly, will always ſerve for this purpoſe.

"When thus guarded, the heap may very ſafely be left till January or February, when it is in general the ſeaſon for ſpreading it: but, before it is uſed, it is always beſt to ſift the aſhes, that the cinders, ſtones, and half burnt turf, may be ſeparated from them.

"This may, perchance, by many be eſteemed an unneceſſary trouble; but experience, which is the beſt guide, has convinced me, that by this means I can better aſcertain the quantity that ought to be ſown on the ſeveral ſorts of land; for the ſmall powdered aſhes, being equal in quality, are of courſe equal in its effect: whereas, when there has been any other mixture with them, the effect has often been greater or leſs than I could have wiſhed. Thus, when I mention the number of buſhels I ſtrew on an acre, it is always to be underſtood of ſifted aſhes: ſhould any farmer be inclined to try them rough as they are firſt produced after burning, the quantity to be allowed for an acre muſt be more in proportion to the mixture of other matter that is in them.

"Theſe peat aſhes are almoſt, as I have already obſerved, a general manure ſuited to every ſoil. On cold clay they warm the too compact particles, diſpoſe it to ferment, crumble, and of courſe fertilize, and, in fine not only aſſiſt it in diſcloſing and diſpenſing its great vegetative powers, but alſo bring to its aid a conſiderable proportion of ready prepared aliment for plants.

"On light lands theſe aſhes have a different effect: here the pores are too large to be affected, or farther ſeparated by the ſalts or ſulphur contained in them; but, being cloſely attached to the ſurfaces of the large particles, of which this earth is generally compoſed, this manure diſpoſes them, by means of its ſalts, to attract the moiſture contained in the air: by this operation, the plants which grow on theſe porous ſoils, are prevented from being ſcorched up and burnt; and if they want, which they generally do, more nouriſhment than the land is of itſelf capable of affording, this is readily and abundantly ſupplied by this uſeful manure.

"In large farms it is very uſual to ſee all the home-fields rich and well-mended by the yard-dung, &c. whereas the more diſtant lands are generally poor, impoveriſhed, and out of heart, for want of proper manure being applied in time.

"Whilſt the farmers depend almoſt entirely on their yard-dung, this cannot fail being the caſe; for dung is of very heavy carriage: they are willing, therefore, to drop it as near home as poſſible, being in this way able to do a great deal more work in the ſame ſpace of time: but would they once try the virtue of peat-aſhes, all their lands might be alike improved, though at a very conſiderable diſtance from the home-ſtall; for ſo few of them are required, and they are ſo light of carriage, that a ſingle tumbril will hold as many as ought, in moſt caſes, to be laid on two acres of land; by which means, when theſe aſhes are uſed as a dreſſing for the diſtant fields, it coſts the farmer leſs in carriage than does that of the ſtable-dung for the home-fields." *Muſeum Ruſticum, vol.* I. *page* 222.

PENNY-*earth*, a term uſed by the farmers for a hard, loamy, or ſandy earth, with a very large quantity of ſea ſhells intermixed in it; ſome of which being round and flat, and in ſome meaſure reſembling pieces of money, have occaſioned the earth's being called by this name. It is an earth not eaſily dug, but is uſually undermined with pickaxes, and then falls in large lumps; which, with the froſts, break to pieces, and leave the ſhells looſe. It is prepared by breaking and mixing well with water, and then makes very deſirable floors. The Jerſey combers comb-pots, are alſo made of it, and the ſides and roofs of ovens are plaſtered with it; and being rightly managed, it combines into a floor almoſt as ſtrong as plaiſter of Paris. *Moreton's Northamptonſhire.*

PERRY, the name of a very pleaſant and wholeſome liquor extracted from pears, in the ſame manner as cyder is from apples. *See the article* CYDER.

The beſt pears for perry, or at leaſt the ſorts which have been hitherto deemed the fitteſt for making this liquor, are ſo exceſſively tart and harſh, that no mortal can think of eating them as fruit: for even hungry ſwine will not eat them, nay hardly ſo much as ſmell to them. Of theſe the Boſbury pear, the Bareland pear, and the horſe pear, are the moſt eſteemed for perry in Worceſterſhire, and the ſquaſh pear, as it is called, in Glouceſterſhire; in both which counties, as well as in ſome of the adjacent parts, they are planted in the hedge-rows and moſt common fields.

There is this advantage attending pear trees, that they will thrive on land where apples will not ſo much as live, and that ſome of them grow to ſuch a ſize, that a ſingle pear tree, particularly of the Boſbury and the ſquaſh kind, has frequently been known to yield, in one ſeaſon, from one to four hogſheads of perry. The Boſbury pear is thought to yield the moſt laſting and moſt vinous liquor. The John pear, the Harpary pear, the Drake pear, the Mary pear, the Lullum pear, and ſeveral others of the harſheſt kinds, are eſteemed the beſt for perry, but the redder or more tawney they are, the more they are preferred. Pears as well as apples, ſhould be full ripe before they are ground.

Dr. Beale,

Dr. Beale, in his general advertiſements concerning cyder, ſubjoined to Mr. Evelyn's Pomona, diſapproves of Palladius's ſaying, that perry will keep during the winter, but that it turns ſour as ſoon as the weather begins to be warm; and gives, as his reaſons for being of a contrary opinion, that he had himſelf taſted at the end of ſummer, a very briſk, lively, and vinous liquor, made of horſe pears; that he had often tried the juice of the Boſbury pear, and found it both pleaſanter and richer the ſecond year, and ſtill more ſo the third, though kept only in common hogſheads, and in but indifferent cellars, without being bottled; and that a very honeſt, worthy, and ingenious gentleman in his neighbourhood aſſured him, as of his own experience, that it will keep a great while, and grow much the ſtronger for keeping, if put into a good cellar, and managed with due care. He imputes Palladius's error to his poſſibly ſpeaking of common eatable pears, and to the perry's having been made in a very hot country: but he would have aſcribed it to a more real cauſe, perhaps, had he pointed out the want of a thorough regular fermentation, to which it appears plainly that the ancients were entire ſtrangers; for all their vinous liquors were medicated by boiling, before they were laid up in order to be kept. *See the article* CYDER.

PHEASANT, a bird ſo nearly allied to our common poultry, that it would naturally appear a very eaſy thing to breed them up from young; but the proper food of them is not ſufficiently enquired into. Though they eat corn when full grown and in health, yet they have recourſe in their young ſtate, and when ſick, to another ſort of food, preying on ſeveral inſects, and that in a very voracious manner.

The young pheaſants and partridges prey upon ants; and they will never ſucceed with us, if they have not a proper quantity of ants to have recourſe to, as ſoon as they leave their rooſt in a morning. When muſty corn, or want of due care in cleaning their houſes, has made them ſick, a repaſt of ants will often recover them. When that fails, they may be offered millepedes or earwigs, or both together, which will always do much better than either ſingly. To this medicine muſt be added a proper care that their common food of corn be very ſweet, their habitation kept nicely clean, and their water ſhifted twice a day. They muſt not be let out of the houſe in a morning till the dew is off the ground; and after ſun-ſet they muſt be immediately taken in again: in the heat of the day they muſt be allowed to baſk in the ſun in a dry ſandy place. With theſe regulations the birds of this kind will ſucceed much better than they uſually do. The pheaſant is a bird of a ſullen diſpoſition, and, when the coupling time is over, there are ſeldom found more than one in a place. *Philoſ. Tranſ.* N° 23.

PIGEON, the name of a well known bird, and of which here are two kinds, the wild and the tame; the latter differ from the former only in bigneſs and familiarity: the wild uſually perch upon trees, being ſeldom ſeen on the ground. Pigeons are of various ſorts, ſuch as carriers, powters, runts, turbets, &c.

There are two ſeaſons when you may eaſily procure a ſufficient ſtock of pigeons, viz. May and Auguſt: for at theſe ſeaſons there are a great number of young pigeons, which may then be purchaſed very reaſonably.

PIGEON HOUSE, a houſe erected full of holes within for the keeping, breeding, &c. of pigeons, otherwiſe called a dove-cote.

Any lord of a manor may build a pigeon-houſe on his land, but a tennant cannot do it without the lord's licence. When perſons ſhoot at or kill pigeons within a certain diſtance of the pigeon-houſe, they are liable to pay a forfeiture.

In order to erect a pigeon-houſe to advantage, it will be neceſſary, in the firſt place, to pitch upon a convenient ſituation, of which none is more proper than the middle of a ſpacious court-gard, becauſe pigeons are naturally of a timorous diſpoſition, and the leaſt noiſe they hear frightens them. With regard to the ſize of the pigeon-houſe, it muſt depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too little: and as to its form, the round ſhould be preferred to the ſquare ones; becauſe rats cannot ſo eaſily come at them in the former as in the latter. It is alſo much more commodious; becauſe you may, by means of a ladder turning upon an axis, eaſily viſit all the neſts in the houſe, without the leaſt difficulty; which cannot ſo eaſily be done in a ſquare-houſe.

In order to hinder rats from climbing up the outſide of the pigeon-houſe, the wall ſhould be covered with tin plates to a certain height, about a foot and a half will be ſufficient; but they ſhould project out three or four inches at the top, to prevent their clambering any higher.

The pigeon-houſe ſhould be placed at no great diſtance from water, that the pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholeſome in cold weather.

The boards that cover the pigeon-houſe ſhould be well joined together, ſo that no rain may penetrate through it. And the whole building ſhould be covered with hard plaiſter, and white-waſhed within and without, white being the moſt pleaſing colour to pigeons. There muſt be no window, or other opening, in the pigeon-houſe to the eaſtward; theſe ſhould always face the ſouth, for pigeons are very fond of the ſun, eſpecially in winter.

The neſts or covers in a pigeon-houſe, ſhould conſiſt of ſquare holes made in the walls of a ſize ſufficient to admit the cock and hen to ſtand in them. The firſt range of theſe neſts ſhould not be leſs than four feet from the ground, that the wall underneath being ſmooth, the rats may not be able to reach them. Theſe neſts ſhould be placed in quincunx order, and not directly over one another. Nor muſt they be continued any higher than within three feet of the top of the wall: and the upper row ſhould be covered with a board projecting a conſiderable diſtance from the wall, for fear the rats ſhould find means to climb the outſide of the houſe.

M. Duhamel thinks that pigeons neither feed upon the green corn, nor have bills ſtrong enough to ſearch for its ſeeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the ſun. "From the time of the ſprouting of the corn, ſays he, pigeons live chiefly upon the ſeeds of wild uncultivated plants, and therefore leſſen conſiderably the quantity of weeds that would otherwiſe ſpring up; as will appear from a juſt eſtimate of the quantity of grain neceſſary to feed all the pigeons of a well-ſtocked dove houſe." But Mr. Worlidge and Mr. Liſle alledge facts in ſupport of the contrary opinion. The latter relates, that a farmer in his neighbourhood aſſured him he had known an acre ſowed with peaſe, and rain coming on ſo that they could not be harrowed in, every pea was fetched away in half a day's time by pigeons: and the former

former ſays, "It is to be obſerved, that where the flight of pigeons falls, there they fill themſelves and away, and return again where they firſt roſe, and ſo proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have ſeen them lie ſo much upon a piece of about two or three acres ſown with peas, that they devoured at leaſt three parts in four of the ſeed, which, I am ſure, could not be all above the ſurface of the ground. That their ſmelling is their principal director, I have obſerved; having ſown a ſmall plat of peas in my garden, near a pigeon-houſe, and covered them ſo well that not a pea appeared above ground. In a few days, a parcel of pigeons were hard at work in diſcovering this hidden treaſure; and in a few days more I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithſtanding they were hoed in, and well covered. Their ſmelling alone directed them, as I ſuppoſed, becauſe they followed the ranges exactly. The injury they do at harveſt on the peas, vetches, &c. is ſuch that we may rank them among the greateſt enemies the poor huſbandman meets withal; and the greater, becauſe he may not erect a pigeon-houſe, whereby to have a ſhare of his own ſpoils; none but the rich being allowed this privilege, and ſo ſevere a law being alſo made to protect theſe winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy againſt them, but to affright them away by noiſes, or ſuch like. You may, indeed, ſhoot at them; but you muſt not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houſes, they cannot bolt or fly out of the tops of them, but by the ſtrength of their tails, after they are thus weakened they remain priſoners at home."

Mr. Worlidge's impounding the pigeons reminds me of a humorous ſtory of a gentleman who, upon a neighbouring farmer's complaining to him, that his pigeons were a great nuiſance to his land, and did ſad miſchief to his corn, replied jokingly, Pound them, if you catch them treſpaſſing. The farmer, improving the hint, ſteeped a parcel of peas in an infuſion of cocolus indicus, or ſome other intoxicating drug, and ſtrewed them upon his grounds. The pigeons ſwallowed them, and ſoon remainded motionleſs on the field: upon which the farmer threw a net over them, incloſed them in it, and carried them to an empty barn, from whence he ſent the gentleman word that he had followed his directions with regard to the pounding of his pigeons, and deſired him to come and releaſe them.

PIGGIN, a little pail or tub, with an erect handle.

PIKE, a name given in ſome counties to what is generally called a fork, uſed for carrying ſtraw, &c. from the barn, cocking of barley, &c.

PINE, the name of a foreſt tree, of which there are various ſpecies, but two only that deſerve cultivating; namely, the Scotch-pine, and the white pine, commonly called in England lord Weymouth's, or New England pine.

The Scotch-pine, ſo called from its growing naturally on the mountains of Scotland, is the tree that affords the red or yellow deal, which is the moſt durable of any of the kind yet known. The leaves of this tree are pretty broad and ſhort, of a greyiſh colour, growing two out of each ſheath; the cones are ſmall, pyramidal, and end in narrows points; they are of a light colour, and the ſeeds are ſmall.

This ſort grows well upon almoſt every ſoil; I have planted numbers of the trees upon peat bogs, where they have made great progreſs. I have alſo planted them in clay, where they have ſucceeded far beyond expectation; and upon ſand, gravel, and chalk, they likewiſe thrive as well; but as they do not grow near ſo faſt upon gravel and ſand, as upon moiſt ground, ſo the wood is much preferable; for thoſe trees which have been cut down upon moiſt ſoils, where they have made the greateſt progreſs, when they have been ſawn out into boards, have not been valuable, the wood has been white, and of a looſe texture; whereas thoſe which have grown upon dry gravelly ground, have proved nearly equal to the beſt foreign deals; and I doubt not but thoſe plantations, which of late years have been made of theſe trees, will, in the next age, not only turn greatly to the advantage of their poſſeſſors, but alſo become a national benefit.

The white pine is one of the talleſt trees of all the ſpecies, often growing a hundred feet high, as I have been credibly informed. The bark of this tree is very ſmooth and delicate, eſpecially when young; the leaves are long and ſlender, five growing out of each ſheath; the branches are pretty cloſely garniſhed with them, ſo make a fine appearance; the cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring: ſo that if they are not gathered in winter, the ſcales open and let out the ſeeds. The wood of this ſort is eſteemed for making of maſts for ſhips; it is in England called lord Weymouth's, or New England pine, as hath been already obſerved. As the wood of this tree was generally thought of great ſervice to the navy, there was a law made in the ninth year of queen Anne, for the preſervation of the trees, and to encourage their growth in America: and it is within forty years paſt theſe trees began to be propagated in England in any plenty, though there were ſome large trees of this ſort growing in two or three places long before, particularly at lord Weymouth's, at Longleet, Sir Wyndham Knatchbull's in Kent; and it hath been chiefly from the ſeeds of the latter that the much greater number of theſe trees now in England have been raiſed; for although there has annually been ſome of the ſeeds brought from America, yet thoſe have been few in compariſon to the produce of the trees in Kent: many of the trees, which have been raiſed from the ſeeds of thoſe trees, now produce plenty of the ſeeds, particularly thoſe in the gardens of the late duke of Argle at Whitton, which annually produce large quantities of cones, which his grace, when living, moſt generouſly diſtributed to all the curious.

All the ſorts of pines are propagated by ſeeds, which are produced in hard woody cones; the way to get the ſeeds out of theſe cones, which are cloſe, is to lay them before a gentle fire, which will cauſe the cells to open, and then the ſeeds may be eaſily taken out. If the cones are kept entire, the ſeeds will remain good ſome years, ſo that the ſureſt way to preſerve them, is to let them remain in the cones, until the time for ſowing the ſeeds: if the cones are kept in a warm place in ſummer, they will open, and emit the ſeeds; but if they are not expoſed too much to heat, many of the ſorts will remain entire ſome years, eſpecially thoſe which are cloſe and compact; and the ſeeds, which have been taken out of cones of ſeven years old,

old, have grown very well, ſo that theſe may be tranſported to any diſtance, provided the cones are well ripened, and properly put up.

The beſt time for ſowing the ſeeds of pines, is about the end of March; when the ſeeds are ſown, the place ſhould be covered with nets to keep off birds, otherwiſe, when the plants begin to appear with the huſk of the ſeed on their tops, the birds will pick off the heads of the plants and deſtroy them.

Where the quantity of ſeeds to be ſown is not great, it will be a good way to ſow them either in boxes or pots filled with light loamy earth, which may be removed from one ſituation to another, according to the ſeaſon of the year; but if there is a large quantity of the ſeeds, ſo as to require a good ſpace to receive them, they ſhould be ſown on an eaſt or north-eaſt border, where they may be ſcreened from the ſun, whoſe heat is very injurious to theſe plants at their firſt appearance above ground. Thoſe ſeeds, which are ſown in pots or boxes, ſhould alſo be placed in a ſhady ſituation, but not under trees; and if they are ſcreened from the ſun with mats, at the time when the plants firſt come up, it will be a good method to preſerve them.

When the plants appear, they muſt be conſtantly kept clean from weed, and, in very dry ſeaſons, if they are now and then gently refreſhed with water, it will forward their growth; but this muſt be done with great care and caution, for if they are haſtily watered, it will waſh the tender plants out of the ground, or lay them down flat, which often rots their ſhanks; and when this is too often repeated, it will have the ſame effect; ſo that unleſs it is judiciouſly performed, it will be the beſt way to give them none, but only ſcreen them from the ſun.

If the plants come up too cloſe, it will be a good method to thin them gently about the beginning of July. The plants, which are drawn up, may then be planted on other beds, which ſhould be prepared ready to receive them, for they ſhould be immediately planted as they are drawn up, becauſe their tender roots are ſoon dried and ſpoiled at this ſeaſon of the year. This work ſhould be done, if poſſible, in cloudy or rainy weather, and then the plants will draw out with better roots, and will ſoon put out new fibres again; but if the weather ſhould prove clear and dry, the plants ſhould be ſhaded every day from the ſun with mats, and now and then gently refreſhed with water. In drawing up of the plants, there ſhould be great care taken not to diſturb the roots of the plants left remaining in the ſeed beds, &c. ſo that if the ground be hard, the beds ſhould be well watered ſome time before the plants are thinned, to ſoften and looſen the earth; and if, after the plants are drawn out, the beds are again gently watered to ſettle the earth to the roots of the remaining plants, it will be of great ſervice to them; but it muſt be done with great care, ſo as not to waſh out their roots, or lay down the plants. The diſtance which ſhould be allowed theſe plants, is four or five inches row from row, and three inches in the rows.

In theſe beds the plants may remain till the ſpring twelve-months after, by which time they will be fit to tranſplant where they are to remain for good; for the younger plants are, when planted out, the better they will ſucceed; for although ſome ſorts will bear tranſplanting at a much greater age, yet young plants planted at the ſame time will in a few years overtake the large ones, and ſoon outſtrip them in their growth; and there is an advantage in planting young, by ſaving the expence of ſtaking, and much watering, which large plants require. I have ſeveral times ſeen plantations of ſeveral ſorts of pines, which were made of plants ſix or ſeven feet high, and at the ſame time others of one foot high planted between them, which in ten years were better trees than the old ones, and much more vigorous in their growth; but if the ground, where they are deſigned to remain, cannot be prepared by the time before mentioned, the plants ſhould be planted out of the beds into a nurſery, where they may remain two years, but not longer; for it will be very hazardous in removing theſe trees at a greater age.

The beſt ſeaſon to tranſplant theſe pines, is about the latter end of March, or the beginning of April, juſt before they begin to ſhoot; for although the Scotch pine, and ſome of the moſt hardy ſorts, may be tranſplanted in winter, eſpecially when they are growing in ſtrong land, where they may be taken up with balls of earth to their roots, yet this is what I would not adviſe for common practice, having frequently ſeen it attended with bad conſequences; but thoſe which are removed in the ſpring rarely fail.

Where theſe trees are planted in expoſed ſituations, they ſhould be put pretty cloſe together, that they may ſhelter each other, and, when they have grown a few years, part of the plants may be cut down to give room for the others to grow; but this muſt be gradually performed, leſt by too much opening the plantation at once, the air ſhould be let in among the remaining trees with too great violence, which will ſtop their growth.

Wherever large plantations are deſigned to be made, the beſt method will be to raiſe the plants either upon a part of the ſame land, or as near to the place as poſſible, and alſo upon the ſame ſort of ſoil; a ſmall piece of ground will be ſufficient to raiſe plants enough for many acres; but, as the plants require ſome care in their firſt raiſing, if the neighbouring cottagers, who have many of them ſmall incloſures adjoining to their cottages; or, where this is wanting, a ſmall incloſure ſhould be made them for the purpoſe of raiſing the plants, and they be furniſhed with the ſeeds and directions for ſowing them, and managing the young plants, till they are fit for tranſplanting, the women and children may be uſefully employed in this work, and the proprietors of land agreeing with them to take their plants, when raiſed, at a certain price, it would be a great benefit to the poor, and hereby they would be engaged to have a regard for the plantations when made, and prevent their being deſtroyed.

The Scotch pines, as was before obſerved, being the hardieſt of all the kinds, and the wood of it the moſt uſeful, is the ſort which beſt deſerves care. This will thrive upon the moſt barren ſands, where ſcarce any thing elſe except heath and furze will grow; ſo that there are many thouſand acres of ſuch land lying convenient for water carriage, which at preſent is of little benefit to any body, that might, by plantations of theſe trees, become good eſtates to their proprietors, and alſo a national benefit; and as the legiſlators have taken this into their conſideration, and already paſſed ſome laws for the encouraging theſe plantations, as alſo for their preſervation and ſecurity, ſo it may be hoped that this will be undertaken by the gentlemen who are poſſeſſed of ſuch land in all the different parts of the kingdom, with proper ſpirit; for although

although they may not expect to receive much profit from these plantations in their own time, yet their successors may, with large interest, and the pleasure which these growing trees will afford them, by beautifying the present dreary parts of the country, will in some measure recompense them for their trouble and expence, and by creating employment for the poor, lessen those rates which are now, in many parts of England, scarce to be borne.

The expence of making these plantations is what most people are afraid of, so would not engage in it; but the greatest of the expence is that of fencing them from the cattle, &c. for the other is trifling, as there will be no necessity for preparing the ground to receive the plants, and the charge of planting an acre of land with these plants, will not be more than thirty shillings where labour is dear, exclusive of the plants, which may be valued at forty shillings more. I have planted many acres of land with these trees, which were covered with heath and furze, and have only dug holes between to put in the plants, and afterwards laid the heath or furze, which was cut upon the surface of the ground about their roots, to prevent the ground drying, and few of the plants have failed. These plants were most of them four years old from seed, nor was there any care taken to clean the ground afterward, but the whole left to shift, and in five or six years the pines have grown so well, as to over-power the heath and furze, and destroy it.

The distance which I have generally planted these plants in all large open situations, was about four feet, but always irregular, avoiding planting in rows as much as possible; and in the planting, the great care is not to take up the plants faster than they can be planted, so that some men have been employed in digging up the plants, while others were planting. Those who take up the plants, must be looked after to see they do not tear off their roots, or wound their bark; and as fast as they are taken up, their roots should be covered to prevent their drying, and put into their new quarters as soon as possible. In planting them, care should be had to make the holes large enough for their roots, as also to loosen and break the clods of earth, and put the finest immediately about their roots, then to settle the earth gently with the foot to the roots of the plant. If these things are duly observed, and a proper season chosen for performing it, there will be very little hazard of their succeeding; but I have seen some plantations made with plants, which were brought from a great distance, and had been so closely packed up, as to cause a heat, whereby most of the plants whithin had their leaves changed yellow, and few of them have grown, which has discouraged others from planting, not knowing the true cause of their failure.

After the plantations are made, the only care they require for five or six years, will be to secure the plants from cattle, hares, and rabbits; for if these are admitted to them, they will make great destruction in a short time; for if the brances are gnawed by hares or rabbits, it will greatly retard the growth of the plants, if not destroy them.

In about five or six years after planting, the branches of the young trees will have met, and begin to interfere with each other, therefore they will require a little pruning; but this must be done with great caution. The lower tier of branches only should be cut off; this should be performed in September, at which time there will be no danger of the wounds bleeding too much, and the turpentine will harden over the wounds as the season grows cold, so will prevent the wet from penetrating of them. These branches should be cut off close to the stem of the plants, and care should be taken in the doing of this, not to break any of the remaining branches of the young trees. This work should be repeated every other year, at each time taking off only the lower tier of branches; for if the plants are much trimmed, it will greatly retard their growth, as it does in general that of all trees, but as these trees never put out any new shoots where they are pruned, so they suffer more from amputation than those which do.

In about twelve or fourteen years these will require no more pruning, for their upper branches will kill those below where they have not air; but soon after this, if the plants have made good progress, it may be necessary to thin them; but this should be gradually performed, beginning in the middle of the plantation first, leaving the outside close to screen those within from the cold, so by degrees coming to them at last, whereby those, which were first thinned, will have had time to get strength, so will not be in danger of suffering from the admission of cold air. When these plantations are thinned, the trees should not be dug up; but their stems cut off close to the ground, for their roots never shoot again, but decay in the earth, so there can no harm arise by leaving them, and hereby the roots of the remaining plants are not injured. The trees which are now cut, will be fit for many purposes; those which are strait, will make good putlocks for the bricklayers, and serve for scaffolding poles, so that there may be as much made by the sale of these, as will defray the whole expence of the planting, and probably interest for the money into the bargain.

As the upright growth of these trees renders their wood the more valuable, they should be left pretty close together, whereby they will draw each other up, and grow very tall. I have seen some of these trees growing, whose naked stems have been more than seventy feet high, and as strait as a walking cane, and from one of these trees there was as many boards sawed, as laid the floor of a room near twenty feet square. If these trees are left eight feet asunder each way, it will be sufficient room for their growth; therefore, if at the first thinning a fourth part of the trees are taken away, the others may stand twelve or fourteen years longer, by which time they will be of a size for making ladders, and standards for scaffolding, and many other purposes; so that from this sale, as much may be made, as to not only pay the remaining part of the expence of planting, if any should be wanting in the first, but rent for the land with interest, and the standing trees for fortunes of younger children. This may be demonstrated by figures, and there has been several examples of late years, where the profits have greatly exceeded what is here mentioned. *Miller's Gard. Dict.*

Pitch, tar, resin, and turpentine, are all made from these trees by a very familiar process. In the spring time, when the sap is most free in running, they pare off the bark of the pine-tree, to make the sap run down into a hole which they cut at the bottom to receive it: in the way, as it runs down, it leaves a white matter like cream, but a little thicker: this is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux, instead of white

white bees wax. The matter that is received in the hole at the bottom, is taken up with ladles, and put in a large basket; a great part of this immediately runs through, and this is the common turpentine. This is received into stone or earthen pots, and ready for sale. The thicker matter, which remains in the basket, they put into a common alembic, adding a large quantity of water; they distil this as long as any oil is seen swimming upon the water; this oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine; the remaining matter at the bottom of the still, is common yellow resin. When they have thus obtained all that they can from the sap of the tree, they cut it down, and, hewing the wood into billets, they fill a pit dug in the earth with these billets, and, setting them on fire, there runs from them, while they are burning, a black thick matter; this naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil: if this hole be made too large, it sets the whole quantity of the tar on fire; but, if small enough, it runs quietly out.

The tar, being thus made, is put up in barrels, and, if it be to be made into pitch, they put it into large boiling vessels, without adding any thing to it: it is then suffered to boil a while, and, being then let out, is found, when cold, to be what we call pitch. *Philf. Tranf.* Numb. 243.

PIP, *or* PEP, a disease among poultry, consisting of a white thin skin, or film, which growing under the tip of the tongue, hinders their feeding. It usually arises from their drinking puddle-water, or eating filthy meat; and is cured by pulling off the film with the fingers and rubbing the tongue with salt.

PLEURISY, an inflammation of the lungs, &c. are disorders in horses, though they have scarce been mentioned by any writer in farriery before Mr. Gibson; who, by frequently examining the carcases of dead horses, has found them subject to the different kinds of inflammations here described.

He has often discovered matter on the pleura (or membrane which lines the chest internally) making its way into the chest; he has found in some horses the whole substance of the lungs black, and full of gangrened water; and in other abscesses of various sizes; and, in short, inflammations in every bowel. He has frequently seen the blood vessels so over-loaded, that the blood has burst out of the smaller vessels, and run over their carcasses in many places, while the collar-maker was fleaing off their hides, and on cutting open the larger vessels, the blood has gushed out as from a fountain, filling all the cavity of the body; an evident proof, that plentiful evacations had been neglected. In order to distinguish these disorders from others, we shall describe the symptoms in Mr. Gibson's own words.

"A pleurisy then, which is an inflammation of the pleura, and a peripneumony, which is an inflammation of the lungs, have symptoms very much alike; with this difference only, that in a pleurisy a horse shews great uneasiness, and shifts about from place to place; the fever, which at first is moderate, rises suddenly very high; in the beginning he often strives to lie down, but starts up again immediately, and frequently turns his head towards the affected side, which has caused many to mistake a pleuritic disorder for the gripes, this sign being common to both, though with this difference:

"In the gripes a horse frequently lies down, and rolls, and when they are violent, he will also have convulsive twitches, his eyes being turned up, and his limbs stretched out, as if he was dying; his ears and feet sometimes occasionally hot, and sometimes as cold as ice; he falls into profuse sweats, and then into cold damps, strives often to stale and dung, but with great pain and difficulty; which symptoms generally continue, till he has some relief: but in a pleurisy, a horse's ears and feet are always burning-hot, his mouth parched and dry, his pulse hard and quick; even sometimes when he is nigh dying, his fever is continued and increasing; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the least offer to change his posture, but stands panting with short stops, and a disposition to cough, till he has relief, or drops down.

"In an inflammation of the lungs, several of the symptoms are the same, only in the beginning he is less active, and never offers to lie down during the whole time of his sickness; his fever is strong, breathing difficult, and attended with a short cough; and whereas in a pleurisy, a horse's mouth is generally parched and dry, in an inflammation of the lungs, when a horse's mouth is open, a roapy slime will run out in abundance; he gleets also at the nose a reddish or yellowish water, which sticks like glue to the inside of his nostrils.

"In a pleurisy, a horse haves and works violently at his flanks, with great restlessness, and for the most part his belly is tucked up; but in an inflammation of the lungs, he always shews fullness, and the working of his flanks is regular, except after drinking and shifting his posture: and his ears and feet are for the most part cold, and often in damp sweats.

"The cure of both these disorders is the same. In the beginning a strong horse may loose three quarts of blood, the next day two quarts more; and if symptoms do not abate, the bleedings must be repeated, a quart at a time; for it is speedy, large, and quick repeated bleedings that are in these cases chiefly to be depended on. But if a horse has had any previous weakness, or is old, you must bleed him in less quantities, and oftener. Mr. Gibson recommends rowels, on each side the breast, and one on the belly; and a blistering ointment to be rubbed all over his brisket upon the foremost ribs.

"The diet and medicines should be both cooling, attenuating, relaxing, and diluting; and the horse should have warm mashes, and plenty of water or gruel. The following balls may be given thrice a day.

> "Take of spermaceti and nitre, of each one ounce; oil of aniseed thirty drops; honey enough to make a ball.

"A pint of barley-water, in which figs and liquorice-root have been boiled, should be given after each ball; to which the juice of lemons may be added; and if the lungs are greatly oppressed with a dry short cough, two or three horns full of the decoction may be given three or four times a day, with four spoonfuls of honey and linseed oil. A strong decoction of the rattle-snake root is also much recommended in pleuritic disorders, and may be given to the quantity of two quarts a day, sweetened with honey. It remarkably attenuates the blood, and dis-

perſes the inflammation, and in ſome parts is deemed a ſpecific for this complaint.

"An emollient clyſter ſhould be injected once a day, to which may be added two ounces of nitre, or cream of tartar.

"In two or three days he will probably run at the noſe, and begin to feed; but ſhould he not, and continue hot and ſhort breathed, you muſt bleed him again, and give the following clyſter:

"Take ſenna and marſhmallows, of each two ounces; fennel and bay-berries, each one ounce: boil in five pints of water to two quarts, pour off the clear, and add four ounces of purging ſalts, two or three of ſyrup of buckthorn, and half a pint of linſeed, or any common oil.

"If by theſe means he grows cooler, and his pain moderates, repeat the clyſter the next day, unleſs it worked too much; then intermit a day; and when he comes to eat ſcalded bran and picked hay, leave off the balls, and continue only the decoction, with now and then a clyſter.

"But let it be obſerved, that a horſe ſeldom gets the better of theſe diſorders, unleſs he has relief in a few days; for if the inflammation is not checked in that time, it uſually terminates in a gangrene, or collection of matter, which for want of expectoration, ſoon ſuffocates him.

"But as pleuritic diſorders are apt to leave a taint on the lungs, great care ſhould be taken of the horſe's exerciſe and feeding, which ſhould be light and open for two or three weeks. Thus a quartern of bran ſcalded, with a ſpoonful of honey and flour of brimſtone, may be given every day, with two or three ſmall feeds of oats, ſprinkled with chamber lye. Inſtead of the bran, for a change, give about a quart of barley ſcalded in a double infuſion of hot water, that it may be ſoftened, and the water given to drink. His exerciſe ſhould be gradual, in an open air and fair weather; and when his ſtrength is recovered, a gentle purge or two ſhould be given; that of rhubarb, when it can be afforded, is beſt, or the purging drink already recommended for this purpoſe.

"There is alſo an external pleuriſy, or inflammation of the muſcles between the ribs, which when not properly treated, proves the foundation of that diſorder, called the cheſt-founder; for if the inflammation is not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines, that a free circulation is obtained; ſuch a ſtiffneſs and inactivity will remain on theſe parts, as will not eaſily be removed, and which is generally known by the name of cheſt-founder.

"The ſigns of this inflammation, or external pleuriſy, are a ſtiffneſs of the body, ſhoulders, and fore-legs; attended ſometimes with a ſhort dry cough, and a ſhrinking when handled in thoſe parts.

"Bleeding, ſoft pectorals, attenuants, and gentle purges are the internal remedies; and externally the parts affected may be bathed with equal parts of ſpirit of ſal armoniac, and ointment of marſhmallows, or oil of chamomile.

"Theſe outward inflammations frequently fall into the inſide of the fore leg, and ſometimes near the ſhoulder; forming abſceſſes, which terminate the diſorder.

"The membrane which ſeparates the lungs, and more particulary the diaphragm, or midriff, is often alſo inflamed; which is ſcarce to be diſtinguiſhed from the pleuriſy, only in this, that when the midriff is greatly inflamed, the horſe will ſometimes be jaw-ſet, and his mouth ſo much cloſed, that nothing can be got in: but the method of cure is the ſame." *Bartlett's Fatriery, page* 51.

PLOUGH, a well known machine for breaking up the ground.

The advantage of digging with the ſpade, or ſuch other inſtrument, very naturally led men to the invention of the plough, a greatly more expeditious way of doing the ſame thing; that is, cutting and breaking the earth into ſmall pieces; but in this the ſpade has the advantage of the common plough, as it goes deeper, and divides the earth more minutely; but the improvement of the common plough into the four-coultered one, ſhews that it is eaſy to make the plough perform this office as much better, as it uſually does it worſe than the ſpade.

The plough deſcribed by Virgil had no coulter; and at this time, the ploughs of Italy and the ſouth of France, have none; and the ploughs in Greece, and in the eaſtern nations in general, are of the ſame kind. Neither is it indeed poſſible to uſe a coulter in ſuch a plough; becauſe the ſhare does not cut the bottom of the furrow horizontally, but obliquely: in going one way it turns off the furrow to the right-hand, but in coming back it turns it off to the left; therefore if it had a coulter, it muſt be on the wrong ſide every other furrow.

It is a great miſtake in thoſe who ſay that Virgil's plough had two earth-boards, for it really had none at all; but the ſhare itſelf always going obliquely, ſerved inſtead of an earth-board; and two ears, which were the corners of a piece of wood lying under the ſhares, did the office of ground-wriſts. This faſhion of the plough continues to this day in thoſe countries; and in Languedoc this ſort of plough performs tolerably well when the ground is fine, and makes a ſhift to break up light land. This is the ſort of land that is common in the Eaſt, and the arable land, about Rome, being never ſuffered to be fallow ſo long as to come to turf: this plough ſucceeds very well in ſuch places, but it would be wholly impoſſible to turn up what in England we call ſtrong land, with it.

The Engliſh ploughs are therefore different from theſe, as the ſoil is different. Our ploughs, where well made, cut off the furrow at the bottom horizontally; and therefore, it being as thick on the land ſide as on the furrow ſide, the ploughs cannot break it off, from the whole land at ſuch a thickneſs, being ſix times greater than what the eaſtern ploughs have to break off, and for this purpoſe it muſt have, of neceſſity, a coulter to cut it off: by this means the furrow is turned perfectly whole, and no part of the turf of it is broken; and if it lie long without new turning, the graſs from the edges will ſpread, and form a new turf on the other ſide, which was the bottom of the furrow before the turning, but is now become the ſurface of the earth, and will ſoon become greener with graſs than it was before ploughing.

If whole, ſtrong, turfy furrows are ploughed croſs ways, as is too commonly practiſed, the coulter cannot eaſily cut them; becauſe, being looſe underneath, they do not make a proper reſiſtance or preſſure againſt its edge, but are apt to be drawn on heaps, and turned in all directions, but without cutting.

Some of our heavy drags, have long iron tines in them; and though theſe broken pieces of furrows, being now looſer than before, require keener edges to cut them,

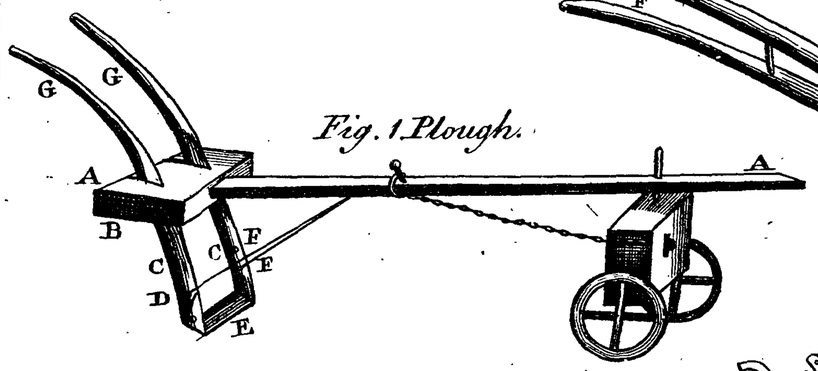


Fig. 1. Plough.

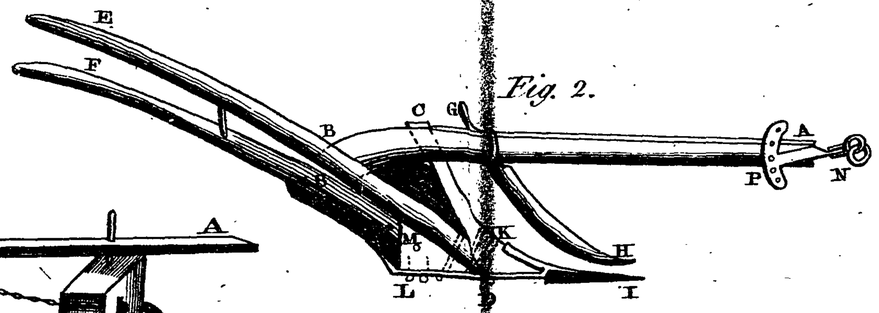


Fig. 2.

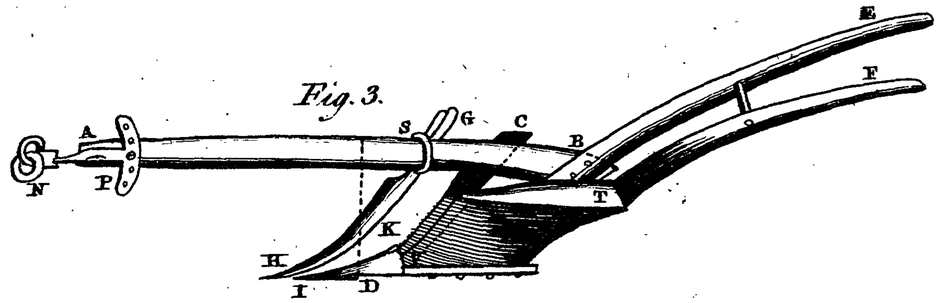


Fig. 3.

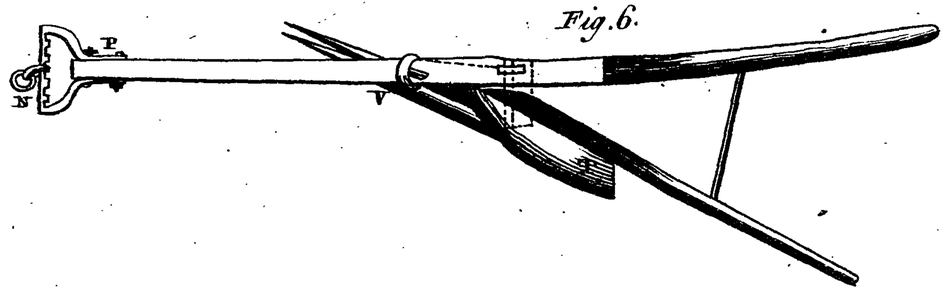
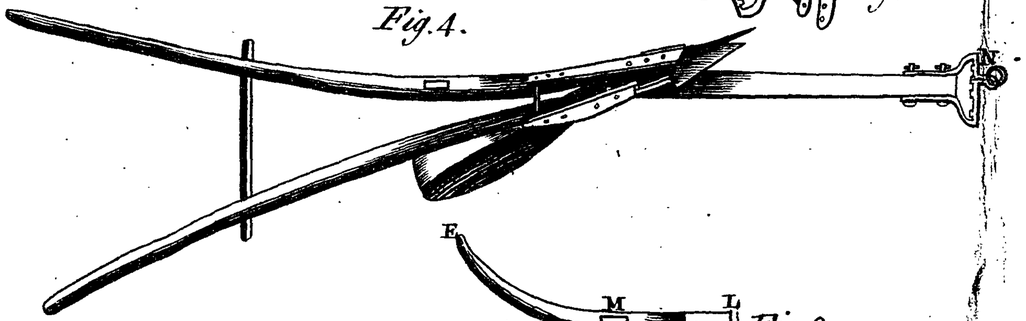


Fig. 6.



Fig. 8.

Fig. 4.



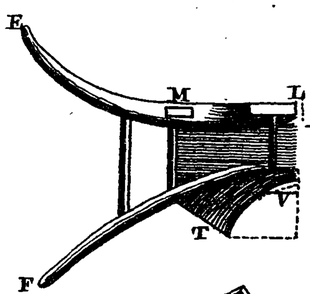


Fig. 8.

Fig. 7.

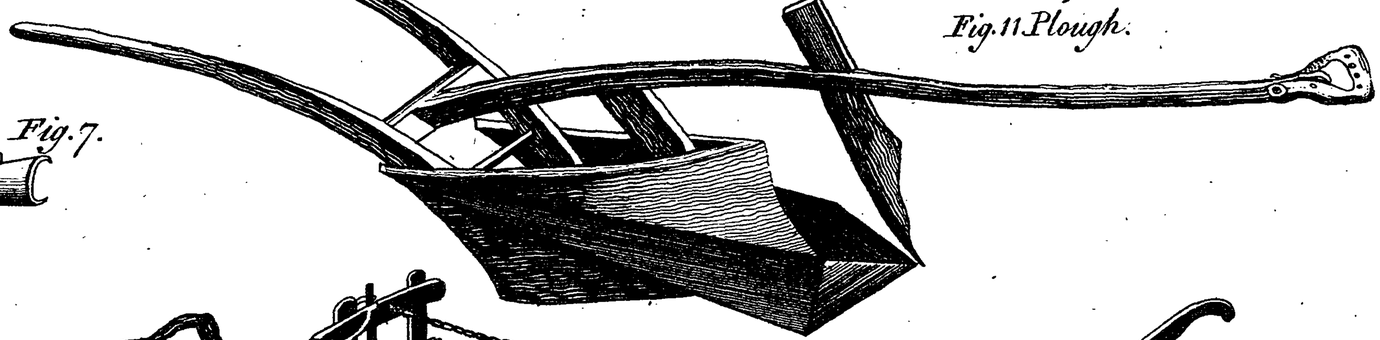


Fig. 11. Plough.

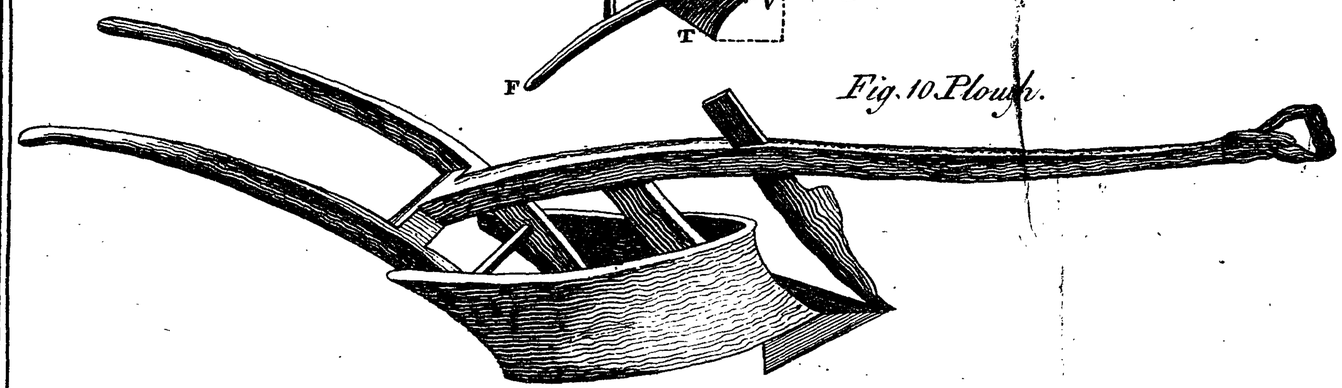


Fig. 10. Plough.

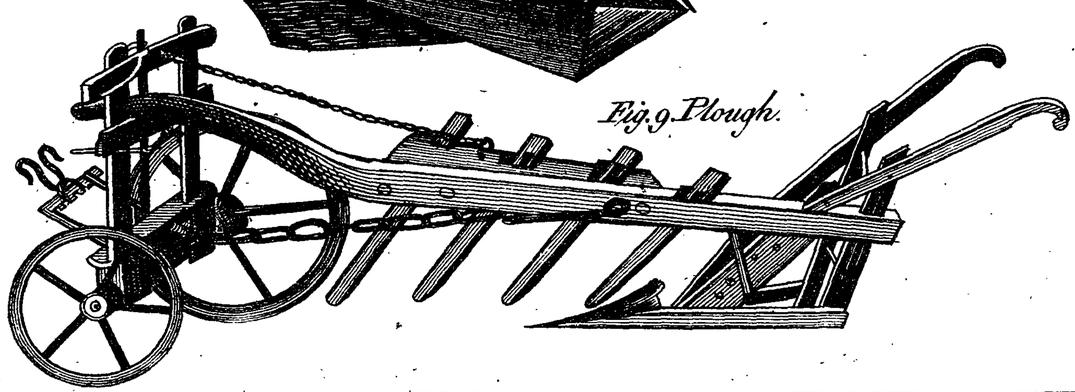


Fig. 9. Plough.

Fig. 1.

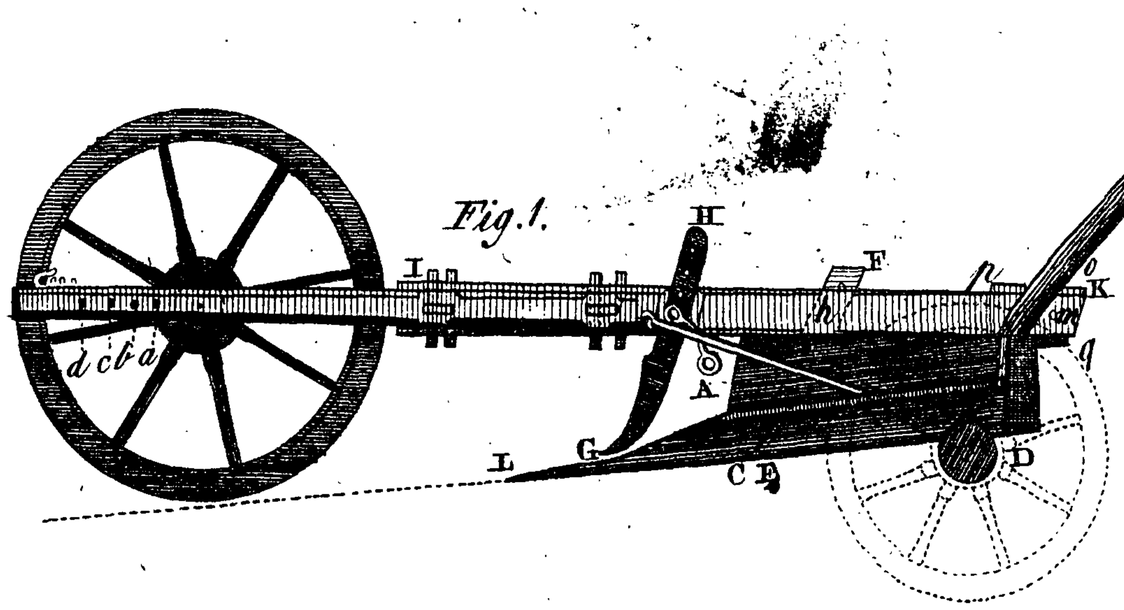


Fig. 4.

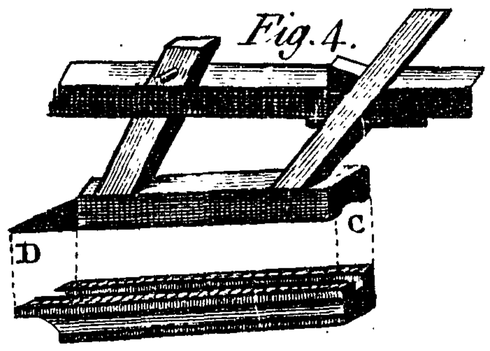


Fig. 9.

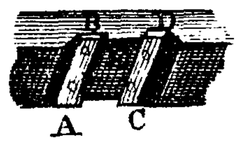


Fig. 2.

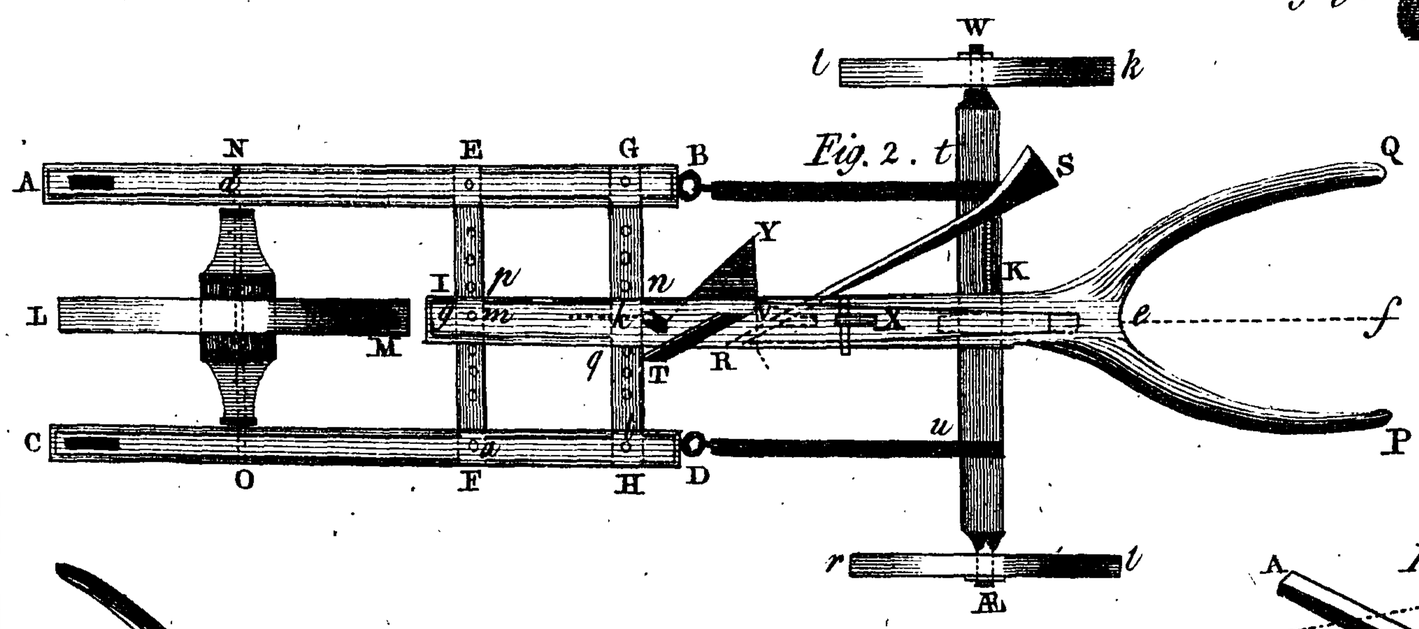


Fig. 10.

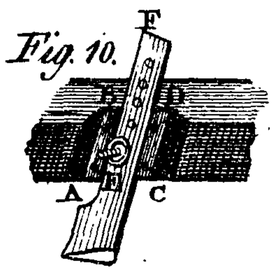


Fig. 5.

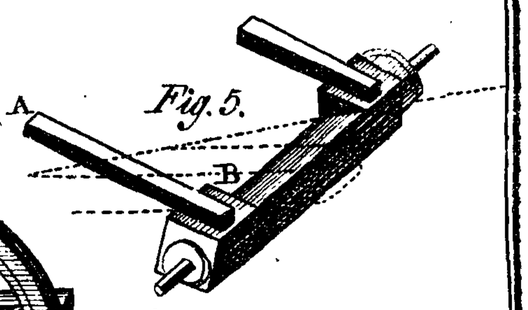


Fig. 3. View of the right side of the Plough.

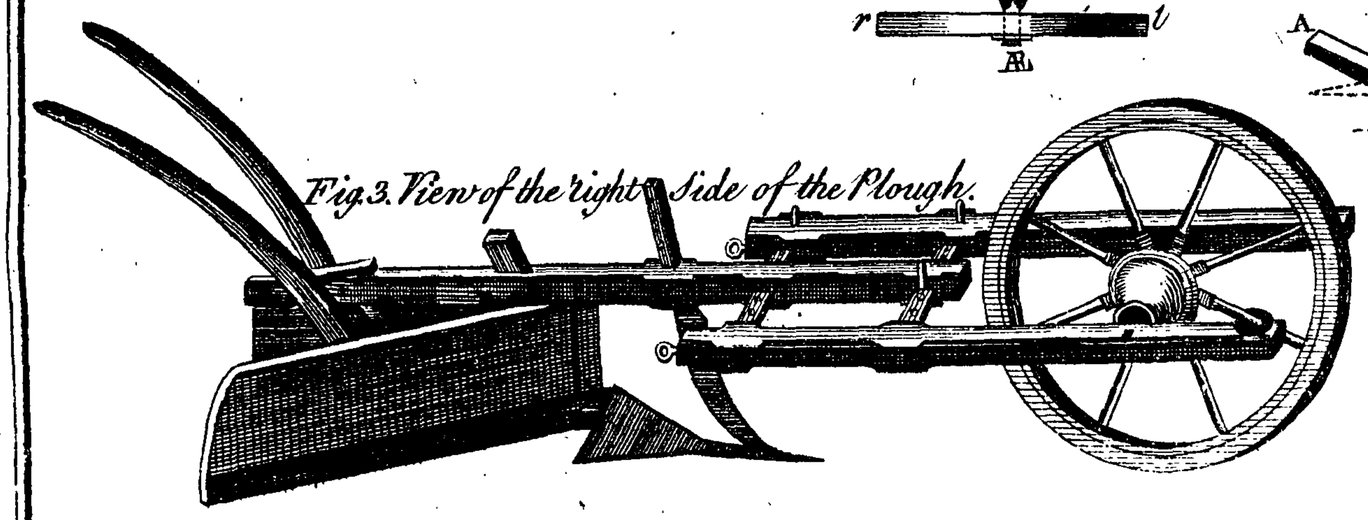


Fig. 6.

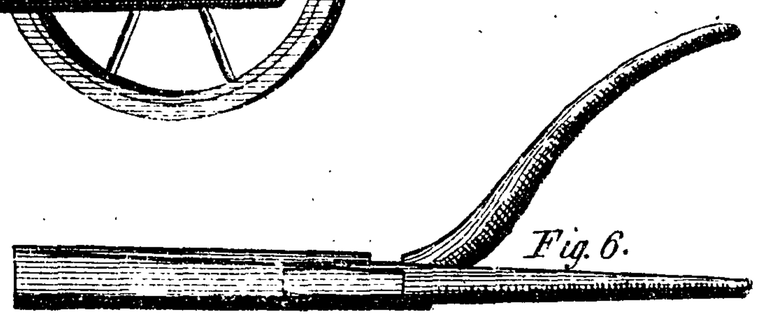


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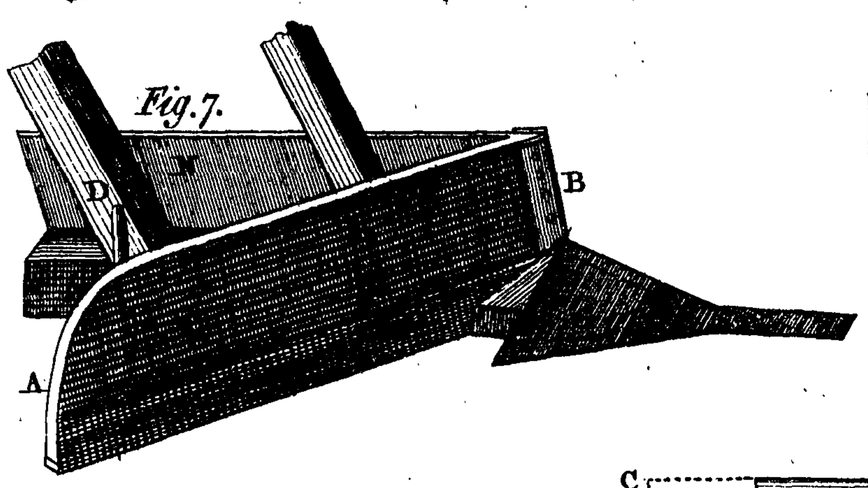


Fig. 8.

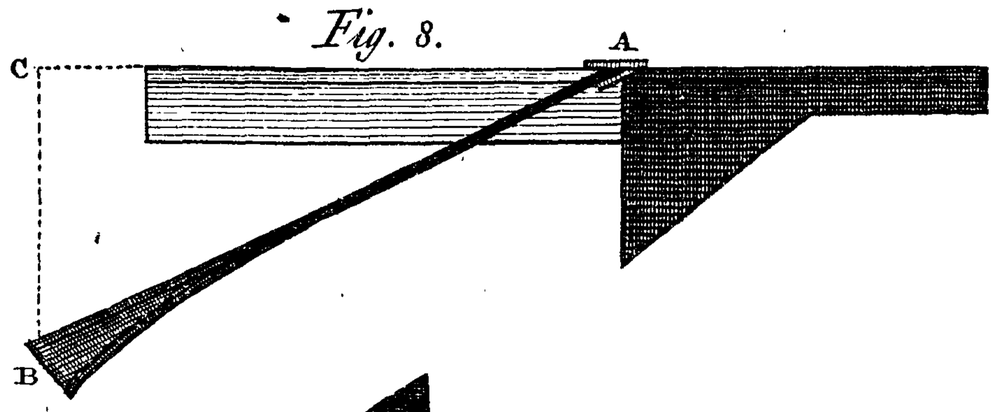


Fig. 11.

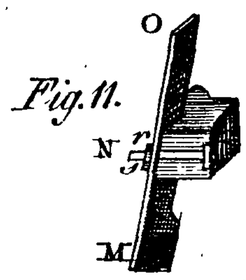


Fig. 12.

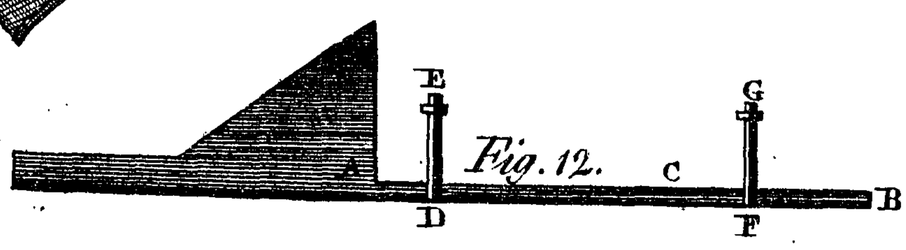
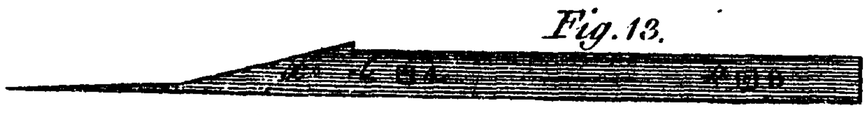


Fig. 14.



Fig. 13.



Scale of Feet for Fig 1 & 2.

Scale of Feet for Fig. 8. 12. 13. & 14.

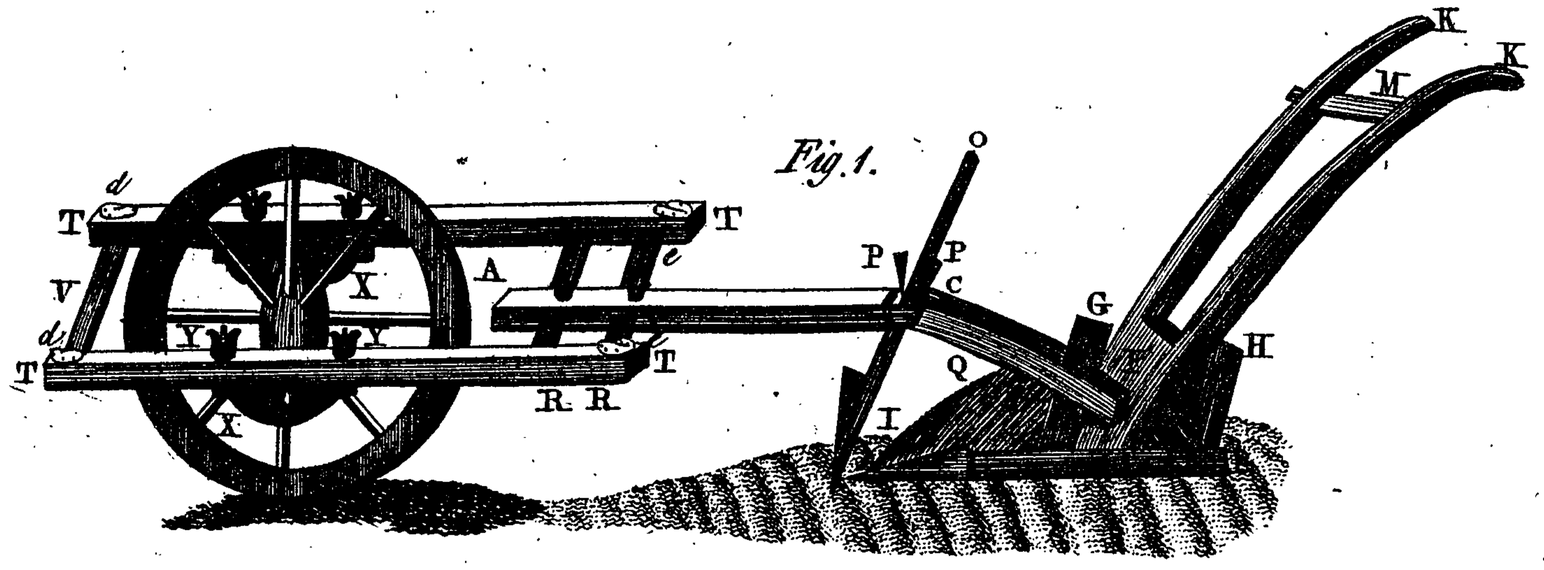


Fig. 1.



Fig. 3.

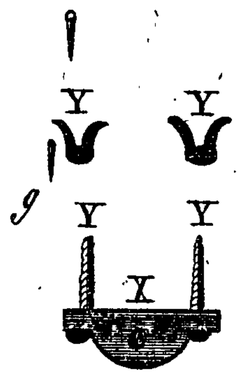


Fig. 4.

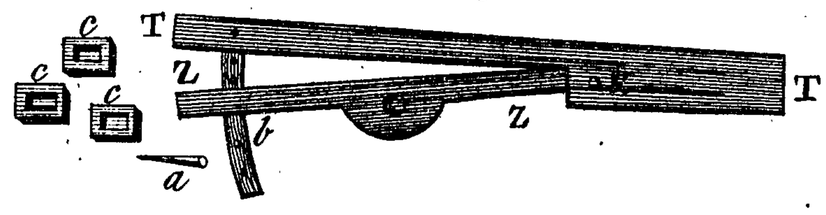


Fig. 5.

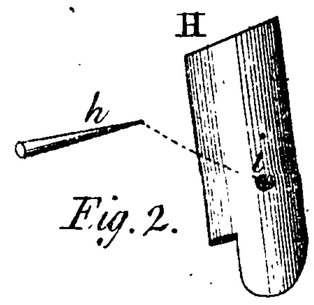
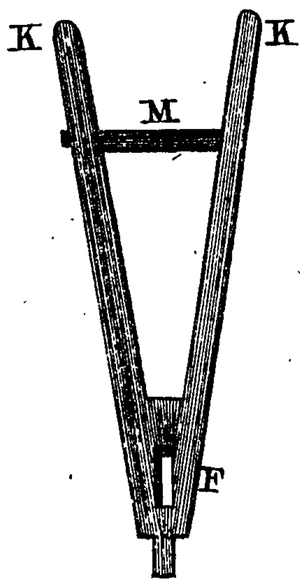
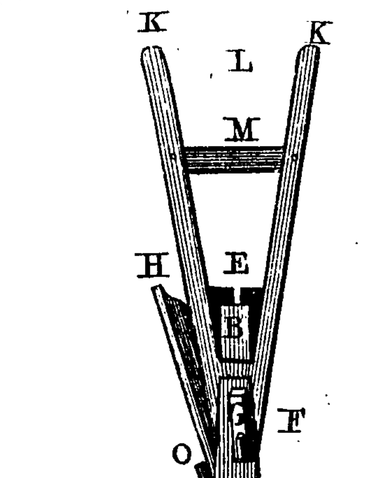
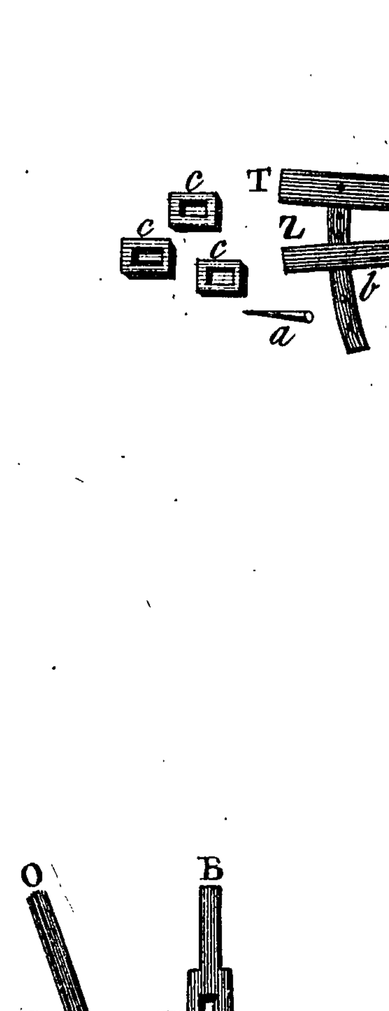


Fig. 2.







Scale of 6 Feet.


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65

them, these tines have no edges at all. Thus the clods of earth are tossed into heaps again, and the surface left bare between them, and great labour and expence is used to very little purpose: all this is owing to the one coulter.

If the soil be shallow, it may be broken up with a narrow furrow, which will the sooner be brought into tilth; but if it be a deep soil, the furrows must be proportionally enlarged, or else a great part of the good mould will be left unmoved, and so be lost. The deeper the land is, the worse it is broke by one coulter; that is, it is broke into larger furrows, and it requires such repeated labour to conquer this, that, often, the best land will scarcely pay the tillage.

This gives an opportunity to servants to cheat their masters. They plough such deep land with a small furrow, and shallow, to the end, that the turf and furrows may be broken the sooner, and the superficial part made fine. They pretend the plough will go deeper the next time; but this is never the case.

This sort of land must not be ploughed the second time in wet weather; for this will cause the weeds to multiply, and the earth will be formed into thick and heavy clods where trodden: and in dry weather, the resistance of the untouched earth below, and the slight pressure of the plough above, will always be reasons why the plough will enter no deeper the second time than it did the first.

Another way to conquer strong turf, is to plough it up first with a breast plough very thin: and when the swerd is rotten, then it is to be ploughed to the proper depth; but this method is liable to great objections; it is very troublesome and expensive, and if the turf be pared off in the winter, or early in spring, it is a chance but the rains come on, and set it to growing faster than before: if, on the other hand, it be pared later in the year, though the turf be thoroughly killed by the succeeding dry weather, yet the time is lost, and the farmer loses the sowing season for wheat, which is the proper corn for such strong land.

Paring PLOUGH, an instrument used in several parts of England, for paring off the surface of the ground, in order to its being burnt. *See the article* BURN-BAKING.

One of the best and simplest instruments of this kind is that which Mr. Bradley gives, with the following description.

From A to A, Fig. 1. Plate XXI. is the plough-beam, about seven feet long, mortised and pinioned into the block B, which is of clean timber, without knots. C C are the sheaths or standards, made flat on the inside, to close equally with the paring-plate, and be fastened to it with a bolt and key on each side, as is marked at D.

E is the paring plate of iron laid with steel, about four inches wide, and from twelve to eighteen inches long, as the business may require. This plate must be made to cut on the sides, which are bolted to the standards, as well as at the bottom part.

F F are two iron braces, to keep the standards from giving way. These standards must be mortised near their outsides, and through the block.

G G are the plough handles, which must be fixed slopewise between the beam and the standards.

The pin-holes in the beam, the use of which is to make this plough cut more or less deep, by fixing the wheels nearer to or farther from the paring plate, should not be above two inches asunder.

Rotheram, or *Patent* PLOUGH, the name of a plough very simple in its construction, easily worked, and therefore deserves the husbandman's particular attention.

Fig. 2. Plate XXI. represents the left or land side of this plough, of which AB is the beam, CD the sheath, EBD the main handle, FR the smaller handle, GH the coulter, KI the sock or share, NP the bridle, S the fly-band, ML a piece of wood in place of a head. The forms of all these different parts, as they appear on this side of the plough, are here represented, and their sizes and distances may be measured by the annexed scale of feet and inches.

Fig. 3. represents the right hand side of this plough, with all the parts that can be seen on that side, in which TV is the mould-board, &c.

Fig. 4. shews the under part of this plough turned up, in which may be seen the shape and size of the share, and the manner in which it is fixed on the sheath, mould-board, and ground-rest, with the angle which they make

Fig. 5. represents the hind-part of the plough, in which are seen the two handles EF, with the hinder-part of the mould-board, VT, and a piece of wood in the place of the head LM, in their proper shapes and sizes by the scale.

Fig. 6. represents an upper view of this plough, as it appears while it works, with the bridle NP extended, the mould-board TV, fixed in its proper position, and all the other parts as they appear in this situation, and in their several shapes and sizes according to the scale.

Fig. 7. is the upper part of the sock or share.

Fig. 8. shews the opening of the share, as it is fixed on the end of the sheath and mould-board.

Fig. 9. is a perspective view of the bridle.

The whole of this plough should be made of ash or elm; the irons should be steeled and well tempered; and that part of the plough which is under ground in tilling, should be covered with plates of iron.

The difference betwixt this and the common ploughs, seems to consist in the bridle at the end of the beam, by which the ploughman can give the plough more or less land by the notches at N in Fig. 4, and 6, or make it cut deeper or shallower by the holes at P, in Fig. 2, and 3. in the coulter and share, which are made and set so as to cut off the new furrow without tearing; and in the mould-board, which is so shaped at first to raise a little, and then gradually turn over the new cut furrow with very little resistance. But the greatest advantage of all is, it being so easy of draught, that it will do double the work of any common plough, as experience has proved; and, with only one man and two horses, will perform, even in stiff land, as much as two men and six horses can do in a moderately light soil with any of the wheeled ploughs generally used, or indeed known in this country, where their great defect is, that they are too complex, and weigh too much upon the fore-carriage, so that the friction of their wheels becomes a considerable addition to the draught: for the best plough certainly is that which is the most simple in its make and tackle; which requires the least strength to draw it, in proportion to the stiffness of the soil; which can be made always to cut to a proper depth; and which, by the shape of its mould-board, is best adapted to turn the furrow upside down. The principle of the Kentish plough, with the shifting mould-board,

is very good, where the land is dry, and will admit of it.

Meſſieurs de Chateauvieux and Duhamel, ever ſtudious to promote the welfare of mankind, have endeavoured to remedy theſe inconveniencies in wheeled ploughs, by the following improvements, which, with their uſual ſpirit of univerſal benevolence, they have moſt obligingly communicated to the world. We ſhall begin with the invention of the former of theſe gentlemen, becauſe it was rather prior, in point of time, to that of M. Duhamel.

The fore-part of M. de Chateauvieux's plough is compoſed of a wheel thirty-two inches in diameter, which may be extended to thirty-four inches, or reduced to thirty: but to fall ſhort of, or to exceed theſe meaſures, would be attended with inconveniencies. This wheel may be made very light, eſpecially if it be encircled with a thin hoop of iron. The plough itſelf is repreſented in Plate XXII. Fig. 1, 2, and 3, where Fig. 2. is the plan, and Fig. 1. the profile.

The frame in which the wheel is placed, is formed by two ſhafts AB CD, Fig. 2. diſtant from each other eighteen inches, from inſide to inſide; which fixes the length of the nave of the wheel. Theſe ſhafts are four feet eight inches long, and may be reduced to four feet four inches, by ſhortening them at the ends C and A. They are about two inches and a quarter ſquare: but the edges ſhould be rounded off. Theſe two pieces are faſtened together by the two croſs ſtaves EF, GH, which are two inches and a half wide, and about an inch thick. They are riveted to one of the ſhafts, at E and G, where they are not to be looſened at all; and at their other ends F and H, the ſhaft muſt be moveable, ſo as to be taken off, to let the two croſs ſtaves through two mortiſes in the beam IK of the plough; after which the ſhaft CD is put in its place, and fixed with two iron pins, *a*, *b*. Between the two ſhafts is placed the wheel LM, the nave of which is pierced through its center, with a hole proportioned to the thickneſs of the iron pin or ſpindle NO, which ſerves for an axle-tree, and is repreſented by the two pricked lines. This ſpindle, or axle-tree, the diameter of which is about three quarters of an inch, ought not to project beyond the outſide of the ſhafts, leaſt it ſhould lay hold of or hurt the ſtalks of the corn, when this plough is uſed for ſtirring the earth between the rows in the New Huſbandry, as will hereafter be more particularly mentioned. To fix it at N, that end is flattened, and bent over the ſhaft to the middle of its upper ſide, where it is faſtened at *d*, by a ſmall pin driven through it and the ſhaft.

On the upper ſurface of each of the ſhafts, at the ends A and C, are the hooks A C, to which the harneſs is faſtened: and at the other ends B and D, are two rings, the uſe of which will be explained hereafter.

The ſhafts AB, CD, ſhould be pierced with four or five holes, to ſet the wheel more or leſs forward or backward, in order to make the plough ſtrike more or leſs deep into the earth, as may be ſeen in Fig. 1. at *a*, *b*, *c*, and *d*. The ſame holes are indicated by the pricked lines on the two ſhafts of Fig. 2. from A to N, and from C to O.

The hind part of this plough conſiſts of the beam IK, Fig. 1, and 2. the ground-reſt CD, Fig. 1. which is covered by the ſhare LD; the handles KP, KQ, Fig. 2. and KP, Fig. 1. the ſheat EF, Fig. 1. of which part is pricked in Fig. 1. and the end appears at X in Fig. 2. the mould-board RS, Fig. 2. part of which is ſeen at N in Fig. 1. the coulter GH, Fig. 1. and TV, Fig. 2. and the ſhare LD, Fig. 1. part of which is ſeen at Y, in Fig. 2.

The beam is four feet eight inches long, excluſive of the tenon which traverſes the handles. Three inches and a quarter ſquare are very ſufficient in its thickeſt part, which is from X to V, Fig. 2. The mortiſes in the beam, which are under *g*, *h*, and through which the two croſs-ſtaves EF, GH, are ſlipt, ſhould be ſo fitted, that the croſs-ſtaves may not ſhake or be looſe in them, at the ſame time that the beam ſhould, by their help, ſlip with eaſe over the croſs-ſtaves, either to the right towards EG, or to the left towards FH, according as the intended ploughing may require. The beam ſhould be faſtened, either by two nuts ſcrewed on at *m*, *n*, which will fix it tight to the croſs-ſtaves EF, GH; or by two iron pins ſtuck through the holes *p* and *q* in the two croſs-ſtaves, one to the right in the croſs ſtaff EF, and the other to the left in the croſs-ſtaff GH. Theſe pins will keep the beam ſteady in its place.

The lower part of the ground-reſt ſhould be ſomewhat concave, as is repreſented at CD, Fig. 4. in order to leſſen its friction againſt the earth.

The beam IK, Fig. 1. and the ground-reſt CD, are faſtened together by the ſheet FE, and the handles PK, both of which laſt are riveted to the ground-reſt by two ſtrong iron pins, the heads of which are ſeen at *g* and *b*; and to the beam, as alſo to the tenon of the beam which traverſes the handles at *m*, *n*; and by the two wedges, *p*, *b*, and *q*, another uſe of which will be explained hereafter.

Wood naturally crooked is beſt to make the handles of, that they may be all of one piece, which ſhould be ſo diſpoſed, that one third of the ſpace between the two handles, ſhould be left on the left ſide, and the two other thirds on the right ſide, in order to facilitate the plowman's walking in the furrow. This diſpoſition is ſhewed in Fig. 2. in which a line *ef*, drawn from the middle of the beam, between the two handles, gives to the left ſide a third *Pf*, of the diſtance PQ between the two handles, and the two other thirds *f*Q to the other ſide.

For want of wood naturally bent to a proper ſhape, theſe handles may be made of two pieces firmly riveted and faſtened together; and if it ſhould be more convenient to the plowman, the whole ſpace between the handles may be on the right-ſide, as in Fig. 6.

The ſheat EF, Fig. 1. ſhould be very ſtrongly and cloſely faſtened by its tenon to the ground-reſt at *g*. An intelligent workman will eaſily make it of a proper ſize, which is about two inches and a half wide, and a full inch thick. The inclining of this piece with the ground-reſt, gives it greater ſtrength to reſiſt, than if it was faſtened to it at right angles.

The mould-board, repreſented by RS, Fig. 2. and AB, Fig. 7. is from thirty to thirty-one inches long, and ten inches high or deep. It ought to be placed as in Fig. 8, where its end A forms an acute angle, terminating at the junction of the fin of the ſhare: its other end B extends beyond the length of the ground-reſt, againſt which it ſhould incline, in ſuch manner that, ſuppoſing the ground-reſt to be lengthened out as far as C, the line CB would be twelve or thirteen inches long, reckoning from the farheſt

fartheſt lateral ſurface of the ground-reſt to the fartheſt lateral ſurface of the mould-board, which, being thus placed, will form the width of a furrow.

The lower part of this mould-board is ſloped a little inward, as is expreſſed by the ſhade in Fig. 7: and the part *b* Fig. 7, ſhould jet out at leaſt two inches beyond the part *a*. To this end, the mould-board ſhould be made of a plank about three inches thick, which will bear being ſcooped on one ſide and rounded off on the other, in order to give it the concavity without, and the convexity within, repreſented in Fig. 3, and 7.

The mould-board ſhould be well faſtened, to prevent its being diſplaced by the reſiſtance of the earth. The upright piece CD Fig. 7, which joins to the handles at its end D, and to the mould-board at its other end C, ſupports it ſtrongly. It is highly neceſſary to cover the part of the mould-board which bears upon the earth, with a thin plate of iron, in order to preſerve it; for otherwiſe it would ſoon be worn out.

The coulter GH, Fig. 1. ſhould be made of good iron well ſteeled. A notch is cut in the beam to receive it, as in Fig. 9 and 10; and as the corners of the notch, C and B, againſt which the coulter bears hardeſt when the plough works, would ſoon be worn away if the wood was left bare, it is proper to ſecure them with two ſmall pieces of iron AB, CD, about the ſixth part of an inch in thickneſs, ſcrewed on with flat-headed ſcrews. Theſe pieces of iron will keep the coulter ſteady in its place.

The coulter ſhould be pierced with ſeveral holes from E to F, Fig. 10, to take it higher up, or let it lower down, as occaſion may require. It is faſtened to the beam, which is pierced at E, Fig. 9, by a ſtrong iron pin with a ſquare flat head, which is let into the beam and lies even with it, as in Fig. 10. The other end of this pin, E, Fig. 10, is a ſcrew, fitted with its nut, by which the coulter is faſtened tight to the beam. Upon this ſcrew, hangs the handle A, Fig. 1. which ſerves to turn it, and at the end of which is the key that faſtens on the nuts of the iron pins which ſecure the ſhare. By this means, the key to turn the ſcrews is always carried with the plough.

M. de Chateauvieux's coulters weigh but five or ſix pounds a-piece at moſt, and frequently not more than three pounds.

He places his coulter ſo that its point G, Fig. 1. projects about an inch beyond the outſide of the ſhare LC.

Fig. 12 repreſents the ſhape of the ſhare, with its dimenſions, as do alſo Fig. 13 and 14. The point of this ſhould be made of good ſteel, and the reſt of good iron, neither too ſoft, nor too high tempered, that it may not be ſubject to break or bend. The tail of the ſhare, AB, Fig. 12, ſhould be thickeſt from A to C, becauſe that is the part which bears the greateſt ſtreſs. Its thickneſs diminiſhes gradually to B, where the ſhare is faſtened to the ground-reſt. This tail is pierced with two round holes at A and B, Fig. 13, through which are put the iron pins DE, FG, Fig. 12. which have ſquare flat heads, lying even with the tail of the ſhare. Theſe pins paſs through the ground reſt, where they are faſtened on the other ſide by the nuts EG. A third round hole may be added at *x*, Fig. 13, in order to faſten the ſhare ſtill more firmly to the ground-reſt, with a ſhort flat headed ſcrew.

M. de Chateauvieux has likewiſe made ſome ploughs with the round holes *ab*, Fig. 13, near A and B; that the iron pins DE, FG, Fig. 12, might not traverſe the tenons of the ſheat and handles; and inſtead of thoſe iron pins, he has riveted them with wooden pins, and found them keep the whole tighter together than the iron ones.

To the left ſide of the plough ſhould be faſtened the thin board N, Fig. 1 and 7, the uſe of which is to prevent the earth from tumbling over between the ſhare and the mould-board. As ploughing wears the point of the ſhare, though it will not hurt this ſo much as it does that of the common plough, it muſt be new pointed from time to time, always obſerving to make the point incline a little towards the earth, as is repreſented by the pricked line DL, Fig. 1; that the ſhare may ſcarcely touch the ground at any other part than D and L, in order to leſſen the friction.

The hind part of the plough, thus formed, is joined to the fore carriage, by running the croſs ſtaves EF, GH, Fig. 2. through the mortiſes of the beams, *gh*; and is fixed there, either by the ſcrews *m n*, or the pins *p*, *q*. The traces of the firſt and ſecond horſe are faſtened to the hooks AC: and if a third horſe be uſed, the traces of that third horſe are faſtened to thoſe of the ſecond. Horſes will do better for this plough, than oxen, unleſs theſe laſt have been uſed to be harneſſed one before the other.

The plough thus equipped, may eaſily be carried to the field, if its hind part is laid upon the little carriage ÆW, Fig. 2. conſiſting of an iron axle-tree ÆW, two ſmall wheels *ki*, *lr*, and the two pieces B*t*, D*u*, at the end of which are the hooks B and D. Theſe wheels are about twenty-one inches, or two feet in diameter; and three feet ſix inches, or even four feet aſunder. They are very light, having but a ſmall weight to bear. The hooks of theſe two pieces B*t*, D*v*, are inſerted in the rings B and D at the end of the ſhafts; and by this means the plough will be carried upon three wheels, of which Fig. 1 and 2 ſhew ſufficiently the arrangement and uſe. Fig. 5, ſhews the ſlope that ſhould be given to the upper ſurface of the middle of the axle-tree of this ſmall carriage, on which the reſt of the plough is to be loaded in order to remove it from one place to another, that the ground-reſt and other pieces may lie flat and ſteady upon it.

To open the firſt furrow with this plough, the wheel muſt be placed at the laſt hole, towards the extremity of the ſhafts. This makes the ſhare incline the more, and conſequently cut the deeper. But as it would be ſomewhat troubleſome to change the poſition of the wheel, at every firſt cut of the plough, a very little attention will remedy that inconvenience. It is only inclining the handles of the plough to the right or left, inſtead of holding them even. The whole plough will incline with the handles, and the ſhare will then enter into the ground with eaſe, and open the firſt furrow. The other furrows are plowed without any ſort of difficulty; and for them the plough is to be held even, or inclined but very little, either to the right-hand or the left, as the ſituation of the land may require.

M. de Chateauvieux generally reſts the beam on the left-hand ſide of the fore-carriage. It is eaſy to place it ſo as to leave whatever diſtance is thought proper between the outmoſt row of corn and the furrow that is actually plowing.

The forwarder the wheel is ſet, the deeper the plough cuts; and ſo on the contrary. But if one would have it cut ſtill deeper, or ſhallower, than it can be made to do by altering the poſition of the wheel, that too may eaſily be effected. By looſening a little the wedge above the

beam

beam *p*, *o*, Fig. 1. and driving farther in the wedge, *q*, the plough will cut leſs deep: as, on the other hand, the ſhare will be more inclined, and therefore cut deeper, if the wedge *q* under the beam is looſened, and the wedge *p*, *o*, over it is driven in tighter.

The chief differences between M. de Chateauvieux's plough, and that of M. Duhamel, are as follow.

1. The beam of this laſt, ABC, Fig. 1. Plate XXIII. bends from C to *B*; whereas that of M. de Chateauvieux's is nearly ſtrait all along.

2. In conſequence of this bending, the hindermoſt extremity of *M. Duhamel's* beam is joined at *B* to the hindermoſt part of the ground-reſt E, after paſſing through a mortiſe F, in the lower part of the handles; ſo that this beam is joined to the ground-reſt by its extremity B, the bottoms of the handles F, and the ſheat G; whilſt that of M. de Chateauvieux's plough, is joined to the ground-reſt by this ſheat, another which this plough has not, and the lower part of the handles: for the beam does not anſwer to the ground-reſt.

3. The mould-board HI, Fig. 2. of this plough, is lighter than that of M. de Chateauvieux's, and differently ſhaped.

4. The two handles KK, are at equal diſtances from the beam, and are joined together by a croſs ſtaff M.

5. The ſhare N, Fig. 3. is pretty much like that of M. de Chateauvieux's plough, but ſhorter and narrower; ſo that it cuts leſs wide furrows; which M. Duhamel rightly thinks the beſt way of plowing.

6. The coulter O of this plough paſſes through a mortiſe in the beam, which is there ſtrengthened by hoops of iron, to prevent the beam's being ſplit by driving in of the wedges PP, which fix the coulter.

M. Duhamel thinks this hind part of his plough preferable to that of M. de Chateauvieux's, for light lands: but it would not do ſo well in ſtiff ſoils, becauſe the earth would be apt to clog about the ſheat at Q; whereas it is thrown off by M. de Chateauvieux's plough. M. Duhamel likewiſe approves of making the beam ſtraight as M. de Chateauvieux's is inſtead of giving it the bending from C to B, eſpecially for ſtiff lands.

7. The beam CA, is fixed to the croſs ſtaves RR of the fore-carriage of this plough, by the ſcrews and nuts SS.

8. The ſhafts TT, are faſtened before by a croſs ſtaff V, which gives great ſolidity to the fore-carriage, and cannot be added to M. de Chateauvieux's plough; not only becauſe the wheel is too large, but likewiſe becauſe it muſt be ſet forwarder or backwarder, in order to make the ſhare cut more or leſs deep.

The wheel of this plough is not ſo large as that of M. de Chateauvieux's, becauſe the axle-tree, inſtead of being inſerted in the ſhafts TT, is let into the ſide pieces X, Fig. 4. which are faſtened to the ſhafts by the ſcrews and nuts YY.

The advantages of having the wheel ſmaller, are, 1. That the plough is leſs apt to lean too much on its ſide, and is more eaſily held upright; 2. That the croſs-ſtaff V may be added to the fore-carriage, by which it is rendered more ſolid; and 3. That the fore-carriage may be made ſhorter than it otherwiſe could be.

The bare inſpection of the draught of this plough ſhews that it is made to cut more or leſs deep, by ſcrewing the nuts Y more or leſs tight, and putting a thicker or thinner wedge between the ſide piece X and the ſhaft, which is an eaſier and quicker way, than changing the ſituation of the wheel. But ſtill, a readier method is, to have under the ſhafts TT, a falſe ſhaft ZZ, Fig. 5. fixed with hinges, &c. for then, by only ſticking the peg *a*, into one of the holes *b*, the beam is raiſed or lowered, in a moment, to whatever degree is thought proper, without altering the poſition of the wheel.

It is likewiſe evident, that in order to give the ſhare a greater or leſs degree of entrance into the earth, nothing more is requiſite than to place the beam nearer to, or farther from, the right-hand ſhaft: for the horſes, which are harnaſſed one before another, go, as does alſo the wheel, in the laſt made furrow, and the plowman goes in the furrow actually making.

dd. Are hooks to faſten on the harneſs of the horſes.

ee. Cramps to faſten the fore-carriage.

ff. Pins to fix the beams to the ſheat.

gg. Pegs to faſten the croſs ſtaves.

h. A ſtrong pin which goes through the hole *i*, to keep the mould-board ſteady.

Four coultered PLOUGH, an inſtrument invented by Mr. Tull, being an improvement on the common plough, that makes it cut the pieces of earth into four; that is, it thus divides the earth four times as ſmall as the common plough.

The common two-wheeled plough has of late years become univerſally uſed in many countries, and is found greatly preferable to the ploughs they uſed before; there is an objection to it, indeed, in regard to ſome ſtiff and miry lands, in which the wheels become clogged up, and cannot turn. This, however, is eaſily remedied by twiſting thumb ropes of ſtraw about the iron circle and ſpokes of the wheels; theſe ſpreading as they turn, and, as the circle twiſt bears upon the ground, throw off the dirt, and never clog. The two principal parts of this plough are the head and the tail: the plough-head contains the two wheels and their axis, or ſpindle, paſſing through a box, and turning round both in it and in the wheels.

There are fixed perpendicularly in this box two crow-ſtaves, as they are called, which are flat and narrow boards, each having on it two rows of holes, whereby to raiſe or ſink the beam of the plough, by pinning up or down the pillow, to increaſe and diminiſh the depth of the furrow. Behind are a pair of gallows, through which the crow-ſtaves paſs at the top by mortiſes, into which they are pinned; and to theſe are faſtened what are called the wilds, which are rings and crooks of iron, by which the whole plough is drawn in the working. From the box to the center of the beam there is carried an iron chain, conſiſting of four, five, or more long links, and called the tow-chain: this faſtens the plough-tail to the plough-head. It is fixed to an iron collar, faſtened in the beam at one end, and at the other paſſes through a hole in the middle of the box, and is pinned in with a wooden pin.

From the ſame iron-collar to which the tow-chain is fixed, there is alſo another chain faſtened, called the bridle-chain: this runs above the beam, as the tow-chain doesbelow it, and is compoſed of ſmaller and more numerous links. At the upper end, as the tow-chain enters the box of the plough, this bridle-chain is fixed to the top of what is called the ſtake of the plough: this is a perpendicular ſtick, carried up parallel with the left crow-ſtaff, and pretty near it, and faſtened to it by a

wyth or rope, or by the end of the bridle-chain itſelf, when that is long enough. This ſtake is alſo faſtened in its lower part, under the gallows, to the ſame crow-ſtaff, by another wyth or piece of rope.

Theſe are the parts of which the head-part of the plough is compoſed. The plough tail conſiſts of the beam carried from the head to the very extremity, and ſerving as the ſupport and baſe of all the reſt. A little below the collar to which the tow-chain and bridle-chain are faſtened, this beam is pierced with a large hole, which lets through the coulter: this is a long and narrow piece, terminating in an edge, and reaching juſt to the ſhare; and it is fixed immoveably in its place by means of a wedge which is driven into the hole of the beam with it: the office of this coulter is to cut the earth as it is thrown up by the ſhare. Behind theſe, the ſame beam is pierced with two more holes, one very near its end: theſe give paſſage to two oblong pieces, called the fore-ſheat and hinder-ſheat, by which the plough-ſhare is ſupported in its place. To the top of the hinder-ſheat there is faſtened a ſhort handle by a wooden pin. Parallel to the hinder-ſheat there runs up a piece of wood of much the ſame form, called the drock; and to this is faſtened another horizontal piece, called the ground-wriſt; theſe are all on the right-hand ſide of the plough, and parallel with the fore-ſheat. There runs another piece of much the ſame form with it, on the right hand; and the bottom of this is the earth-board. The long handle of this, which reaches as far as that of the ſheat, is faſtened to the drock by a pin, the other end of which goes into the beam. Near the lower end of the fore-ſheat, there are two flat pieces of iron, which paſs from the two ſides of it up to the beam; and being let through it, are faſtened to the upper part by ſcrews and pins. Theſe keep the ſheat in its place.

The ſtructure of the four-coultered plough is different, in ſome reſpects, from this, though in general founded on it. Its beam is ten feet long, whereas that of the common plough is but eight. The beam is ſtrait in the common plough, but in this it is arched in one fourth part of its length, near the plough-head. At the diſtance of three feet two inches from the end of the beam at the plough-tail, the firſt coulter, or that next the ſhare, is let through; and at thirteen inches from this, a ſecond coulter is let through; a third at the ſame diſtance from that; and, finally, the fourth at the ſame diſtance from the third, that is, thirteen inches.

The crookedneſs of the upper part of the beam in this plough is contrived to avoid the too great length of the three foremoſt coulters, which would be too much, if the beam was ſtrait all the way; and they would be apt to bend and be diſplaced, unleſs they were vaſtly heavy and clumſy. Aſh is the beſt wood to make the beam of, it being ſufficiently ſtrong, and yet light.

The ſheat in this plough is to be ſeven inches broad. The fixing of the ſhare in this, as well as in the common plough, is the niceſt part, and requires the utmoſt art of the maker; for the well going of the plough wholly depends upon the placing of this. Suppoſing the axis of the beam, and the left ſide of the ſhare, to be both horizontal, they muſt never be ſet parallel to each other; for, if they are, the tail of the ſhare, bearing againſt the trench as much as the point, would cauſe the point to incline to the right hand, and it would be carried out of the ground into the furrow. If the point of the ſhare ſhould be ſet ſo, that its ſide ſhould make an angle on the right ſide of the axis of the beam, this inconvenience would be much greater; and if its points ſhould incline much to the left, and make too large an angle on that ſide with the axis of the beam, the plough would run quite to the left hand; and, if the holder, to prevent its running quite out of the ground, turns the upper part of his plough toward the left hand, the pin of the ſhare will riſe up, and cut the furrow diagonally, leaving it half unploughed. To avoid this and ſeveral other inconveniences, the ſtraight ſide of the ſhare muſt make an angle upon the left ſide of the beam; but that muſt be ſo very acute a one, that the tail of the ſhare may only preſs leſs againſt the ſide of the trench than the point does.

The great thing to be taken care of, is the placing the four coulters; for on this the ſucceſs of the whole depends. Theſe muſt be ſo ſet, that the four imaginary planes deſcribed by their four edges, as the plough moves forward, may be all parallel to each other, or very nearly ſo; for if any one of them ſhould be very much inclined to, or ſhould recede much from either of the other, then they would not enter the ground together. In order to the placing them thus, the beam muſt be carefully pierced in a proper manner. The ſecond coulter-hole muſt be two inches and an half more on the right hand than the firſt: the third muſt be as much more to the right of the ſecond, and the fourth the ſame meaſure to the right hand of the third: and this two inches and an half muſt be carefully meaſured from the center of one hole to the center of the other. Each of theſe holes is a mortiſe of an inch and a quarter wide, and is three inches and an half long at the top, and three inches at the bottom. The two oppoſite ſides of this hole are parallel to the top and bottom, but the back is oblique, and determines the obliquity of the ſtanding of the coulter, which is wedged tight up to the poll. A perſpective view of this curious plough the reader will find in Plate XXI. Fig. 9.

The coulter is two feet eight inches long, before it is worn; the handle takes up ſixteen inches of this length, and is allowed thus long, that the coulter may be driven down as the point wears away. *Tull's Horſe-hoeing Huſbandry.*

The four-coultered plough being heavy, difficult to manage, and fit only to break up meadow ground, or ground where there are very few or no ſtones, is now in diſuſe. The ſcarificator may be ſubſtituted to break the turf, and the land ploughed deeper afterwards. But it is ſtill a better way of breaking up land, to trench-plough it; firſt paring the ſurface with a paring-plough, about two inches deep, turning the graſs ſide downwards, upon which with a common plough immediately following, in the ſame furrow, turn a deeper furrow upon the turf, going in all as deep as the ſtaple will admit. This ſhould be done in autumn; and if it is good meadow land, wheat may be ſown upon it; if not, let it remain a winter fallow, and ſow oats upon it in the ſpring. In either caſe the turf will be rotten by the time the wheat or oats are cut and carried off, and the land will be ready for other crops to follow in the common courſe, if to be continued in tillage; but if intended to be laid down again to graſs, a crop of turnips is a good preparative; and at any rate lay it down in good heart. The ſcarificator will anſwer the purpoſe cheaper, without breaking up the land. *See the article* MEADOW.

Double

Double PLOUGH, an inſtrument invented by Mr. Randal, which, by putting the ſhare point to the middle of the interval left by the horſe-hoe, throws the mould on each ſide of it, at the ſame time, towards the rows, and earths them up to what degree the ploughman pleaſes, in order to nouriſh them on to perfection. If a common plough, inſtead of the ſingle hough, was uſed, the furrows would be turned into the middle of the interval, and appear in the form of a ſingle ridge: and if the plough went twice in a place, to deepen the ſoil, the ridge in the middle would be proportionably higher, and the ground ſtrangely improved by ſuch operations, and the vegetables ſurpriſingly promoted in their growth. In either of theſe caſes, of the plough's going once or twice in a place, the double plough, by taking faſt hold of the mould, throws all back again; and if the vegetables are not effectually earthed up, which may be the caſe after double ſpitting the intervals, then running the double plough over again, compleats the buſineſs, and ſtrangely toſſes about and mellows the ground. This, in general, is the uſe of this plough in earthing up vegetables, that have three feet intervals.

But under the name of this double plough, we are to underſtand another of the ſame form, much narrower in the tail, to perform what is called ridge-work, which is either ſingle or double: if ſingle, this double plough works alone, throws up the ridges, and, at a proper time, ſplits them, and throws them back into the trenches; and this toſſes the mould backwards and forwards, which, by theſe agitations, and other operations, is made ready for cropping, as is particularly mentioned in my Treatiſe. If theſe ridges are to be double, that is, if there is to be double ſpitting, then the double plough performs as before, and goes as deep as is conſiſtent with the intereſt of the man's arms, and the horſe's eaſe. Here the worthy ploughman is requeſted to keep his hands even, that the plough may run flat upon its ſole, and clear the trench of mould, as far as neceſſary, which it is made to do in that poſture, to make way for the lifting-plough, of the ſame breadth in the tail. *See* Plate XXI. Fig. 10.

Double-lifting-PLOUGH. My earneſt deſire, ſays Mr. Randal, to imitate gardeners, in preparing the ſoil, by their always going a good depth, and which to be ſure, is the true biaſs of nature, in regard that vegetables, in general, require a looſer habitation, beneath the ſoil, to greater depth than farmers will allow them: this deſire produced the lifting-plough, to raiſe the generous mould that lies far beneath the reach of common ploughing, into general uſe. This I have practiſed to very great effect, and never failed doing it, in all the going ground of the tenures of near a thouſand acres, where the ſtratum, below the uſual ſoil, would give me this deſirable and encouraging advantage. Hence it was, that I was always extremely fond of this lifting-plough, which never fails of ſucceſs in the hands of an honeſt, worthy ploughman; and, no doubt, there are many ſuch to be found. I was very imprudent, in my firſt conſtruction of this plough, in having it made too large, in order, through a covetous diſpoſition, to have much work done in a day. The draught was ſo fatiguing to the horſes and men, that the invention was under a good deal of diſrepute, and I was in danger of having all the ſervants leave the ſervice, and of killing the horſes: for theſe reaſons, I was obliged to ſit down with that loſs, great as it was, in the purchaſe of this plough, and contract all the proportions of it, to make the draught quite eaſy to the team and men; and then there was not the leaſt complaint heard, but only a backwardneſs to proceed, which uſe effectually removed.

Here, then, this lifting plough is to go into all the trenches made by the double plough, as mentioned before; and as the ploughman deepens the trenches as far down as is conſiſtent with his own and horſes eaſe, the irons, running up on each ſide of the plough, will lift up the mould, which will be thrown, by the motion, upon the old ridges. The ground now lies in deep trenches, and high ridges; and this is what is called, in my Treatiſe, double ridges; and how the ſoil is to be afterwards reduced to a level, and receive farther management, is therein particularly mentioned. Now, from the conſtruction of theſe two ploughs, the ſoil beneath will, if the ploughman keeps his hands even, be cut level, inſtead of leaving there hills and dales, but too often practiſed, to the diſcouragement of the growth of the vegetables. *See* Plate XXI. Fig. 11. *Randal's Semi-virgilian Huſbandry.*

PLOUGHING, the action of breaking up, and looſening the ſoil.

"The principle, ſays M. de Chateauvieux, of thoroughly dividing and looſening the ſoil, is ſo generally received, that there is not a farmer who does not know, that one ploughing more than ordinary is of as much ſervice to his ground, as dunging it would be. Experience muſt have ſhewn them, that his crops are increaſed by this extraordinary ploughing: but he is not ſufficiently ſenſible, that of all the ways of improving his land, no one is more effectual, or leſs expenſive than this. Were its full value known, it would be more generally practiſed, and every huſbandman would give all his lands at leaſt one ploughing extraordinary.

"To ſatisfy myſelf of what might be done with the plough alone, I reſolved to make a trial on a ſpot of ground which I knew to be incapable of naturally producing any thing. Some years before, I had dug away the earth, three feet deep, from a ſpace of ſixty ſquare perches. Nothing remained in it but a white clay, like that which potters uſe. This ſpot, thus circumſtanced, ſeemed to me a proper one for my experiment. As the ſpace was too ſmall for a plough to work in, I had recourſe to the ſpade and hoe. The ground was laid out in beds, which were afterwards ſowed with wheat, and the ſpaces between them were frequently ſtirred. The firſt year my plants were very poor, and branched into only two, three, or four ſtalks apiece. In the ſecond year, they did much better; and in the third, they were as large and fine as any my garden could have produced. This ſpot ſtill continues to produce equally well; the ſoil is now like fine mould; and, which is very remarkable, it has loſt its former white colour, and is become black. We have here a ſtrong inſtance of what may be done by pulverizing the earth. Let us but do the ſame with any of our bad lands, and perſevere in ploughing and ſtirring them a ſufficient time; the ſucceſs will not be doubtful.

"To be ſtill farther convinced of the truth of this important maxim in huſbandry, that the earth ſhould be thoroughly looſened by deep and frequent ploughings, I examined very carefully, whether my lands which had been prepared by repeated ploughing only, without the aſſiſtance of any dung or manure, were much looſened and rendered lighter, than thoſe which were under the common

mon management. All my obſervations proved that they were. The firſt glance of my eye ſhewed me, that their ſurface was ſmoother; on ſounding the furrows, I found them deeper; and much leſs ſtrength was required to plough them; two horſes, or ſometimes only one, or a ſingly ox, doing here with eaſe, what would otherwiſe have employed double that number of cattle: a manifeſt proof that my grounds were in excellent tilth: whereas the common fields offered nothing pleaſing or ſatisfactory to the eye; the earth there was extremely hard, cloſe, and compact, and its ſurface almoſt as firm as that of a beaten road. The ground which had been well and often ploughed remained ſo light and ſoft, after its crop of wheat was taken off, that I thruſt a ſtick of green willow eight or ten inches deep into it without the leaſt difficulty, though I could not by any means puſh it at all into the land cultivated in the common way."

Camillo Tarello, a native of Lonato, in the Venetian territories, concerned to ſee the neglected and dreadful miſmanaged ſtate of huſbandry in his country, wrote his ſmall, but highly valuable treatiſe of Agriculture, and preſented it to the ſenate of Venice under the title of *Ricordo d' Agricultura*. The ſenate, in juſtice to the excellency of this work and the patriotic intentions of its author, granted him, on the 29th of September 1566, not only the ſole right of vending his book, but alſo ordered at the ſame time that all ſuch as adopted his new method of huſbandry, ſhould pay to him, and afterwards to his deſcendants, four marchetti (about three halfpence of our money) for every acre of corn land, and two marchetti for every acre of other land, planted according to his direction. The Berne Society have favoured the public with the firſt part of Tarello's excellent treatiſe; and we ſhall take from thence the following extract as a farther proof of the neceſſity of thorough ploughing.

"When we conſider, ſays that good patriot and intelligent huſbandman, Camillo Tarello, that every ear of wheat yields fifty grains (we will ſuppoſe that to be the medium number) we may infer, that if all theſe were ſowed and grew, we ſhould reap fifty times as much as was ſown: but our crops are far from being ſo abundant. This failure cannot proceed from any other cauſe than that all theſe grains do not riſe and proſper; nor can any but one, or all, of the ſeven following reaſons be aſſigned for it, if we except bad ſeaſons and extraordinary accidents.

"The deficiency ariſes either 1, from the ſeed: or 2, from rain, when the corn is in bloom; 3, from winds, when its ſtalks are large; 4, from birds, which eat up the grains that have been ſown; 5, from worms and inſects; 6, from the earth; or, 7, from the cultivator himſelf.

"The cauſe of this defect is not in the ſeed: for, either the ſeed is good, or it is not: if it be not good, the grains will not riſe at all; but if it be good, as we ſuppoſe it to be, each grain may, and ſhould, produce at leaſt one ear. Another proof is, that if a parcel of ſeeds are planted at a proper depth, one by one, in holes made on purpoſe for them, and an equal number of the ſame kind of ſeeds are ſowed at random in the ſame ſort of ground, all the former will riſe, but not all the latter.

"Neither ought it to be aſcribed either to rain or winds, at the time of the bloſſoming of the corn: becauſe we do not reap fifty for one, even when the weather is then very fine; and even when each ear bears fifty grains, we do not reap fifty times the ſeed.

"Nor ought we to accuſe the birds of the air: it being well known that lupins, which they never touch on account of their bitterneſs, do not all riſe; for if they did, the crop would ſtill be more conſiderable, as each of theſe plants bears from fifty to ſixty ſeeds. Beſides, what the birds eat is not conſiderable.

"Worms and inſects are not the cauſe, for three reaſons, firſt, our crops are very little better even when neither worms nor inſects are to be ſeen; ſecondly, the caſe here is the ſame as that of the lupins; and, thirdly, the worms would ravage whole fields (as they ſometimes do) in ſo viſible a manner, that it would be eaſy to diſtinguiſh the cauſe of the miſchief. However, this is an extraordinary and pretty rare event.

"The ſame may be ſaid of fogs, cold, bad weather, reptiles, and other miſchievous creatures. Though theſe enemies do not injure our fields every year, we nevertheleſs conſtantly reap leſs corn than they might be made to produce.

"Laſtly, the earth is not in itſelf the cauſe of this ſcantineſs of increaſe: for the Creator has endowed it with perpetual youth and fruitfulneſs, as Columella juſtly and prettily obſerves in the firſt chapters of his firſt and ſecond books. The earth and nature are always the ſame.

"Now, if the uſual cauſe why we do not reap fifty for one cannot be imputed to either of the things abovementioned, it muſt of neceſſity be ſought for in the ignorance, negligence, and indolence of the huſbandman: for our practice is diametrically contrary to that of the ancient Romans. They ploughed often, and ſowed little: yet every family lived upon the produce of its ſmall farm: but we who plough little and ſow a great deal, are always diſappointed."

The Romans were not only extremely attentive to the thorough culture of their land, but alſo, even in the latter time of the republic, laid it down as a maxim to be followed by all good huſbandmen, "to ſow but little and plough much." This is ſtrictly enjoined by Virgil; and Pliny, who inſtances the huſbandry of Creſinus, as an example of the good effects of this practice, laments the deplorable condition of Italy, when rich men, with the help of their numerous ſlaves, farmed large diſtricts of land; becauſe it diminiſhed the number of Roman citizens, and rendered the country leſs fruitful: for, as both he and Columella obſerve, the Romans then became dependant on other nations for the means of ſubſiſtance.

May not this naturally lead us to caſt an eye upon our own country, where, of late years, gentlemen throw their eſtates, as much as poſſible, into large farms, which, in the language of Mago the Carthaginian, muſt, in general, render the farm ſtronger than the farmer, whereby it neceſſarily becomes leſs fruitful? This practice is attended with another moſt fatal conſequence to a manufacturing and trading people: it leſſens the number of inhabitants in the country, from whence only the ſupply of population ariſes; for cities and large towns are always an expence of men.

Whilſt we beſtow this due commendation on ploughing, we do not mean to recommend it on Mr. Tull's principles, "that dividing and pulverizing the earth is all in all." When the earth is in fine tilth, ſo that the roots of plants can eaſily extend themſelves every way, an advantage ariſes, which is thus deſcribed by the ingenious M. J. J. Biberg, in his œconomy of nature.

" Plants, as well as living creatures, muſt ſubmit to death. They ſpring up, they grow, they flouriſh, they ripen their fruit, they wither, and at laſt, having finiſhed their courſe, they die, and return again to the duſt, from whence they firſt took their riſe. Thus the black mould which we ſee upon the ſurface of the earth, is chiefly owing to dead vegetables. For all roots deſcend into the earth by their branches, and after a plant has loſt its ſtem, the root remains; but this too rots at laſt, and changes into mould. By this means, this kind of mould is mixed with the earth, by the contrivance of nature; nearly in the ſame way as dung thrown upon fields is wrought into the earth by the induſtry of the huſbandman.

" The earth thus prepared offers again to plants from its boſom, what it had received from them. For when ſeeds are committed to the earth, they draw to themſelves, accommodate to their nature, and turn into plants, the more ſubtile parts of this mould, by the co-operation of the ſun, air, and moiſture; ſo that the talleſt tree is, properly ſpeaking, nothing but mould wonderfully compounded and modified by a virtue communicated to a ſmall ſeed by the Creator. From theſe plants, when they die, juſt the ſame mould is formed, as give birth to them originally; but in ſuch a manner, that it is in greater quantity than before, if the earth be kept looſe to admit of the free extenſion of the roots. Vegetables therefore increaſe the black mould; whence fertility remains continually uninterrupted: whereas the earth would not make good its annual conſumption, if it were not conſtantly recruited by new ſupplies."

The illuſtrious M. Lullin de Chateauvieux, to whom the world in general is infinitely indebted for ſome of the moſt judicious and beſt executed experiments ever made in Agriculture, as is his native country in particular for his excellent adminiſtration in the high office of chief magiſtrate of the republic of Geneva, is the firſt writer who has attended to the advantages of ſtubble as a manure.

Towards the latter end of the year 1753, walking over his grounds after harveſt, he was ſtruck with the difference which he found in the ſtubble of his own experiments, and that of the corn which had been raiſed in the common way. This laſt was ſo poor and weak, that it ſcarcely oppoſed the motion of his feet, while the other reſiſted greatly. " I often felt it break, ſays he, under my feet, and frequently met with tufts of twenty, thirty, forty and ſometimes more ſtalks, which ſtopt me ſhort, like ſo many little buſhes. I am the more particular in my account of this ſtubble, becauſe it ſhews the great ſtrength of the plants, which they would not have had if the earth had not been well prepared. Beſides, it has its real uſe: for thorough plowing ſupplies the want of dung, not only by keeping the earth conſtantly in a looſe ſtate, but likewiſe by the quantity of ſtrong ſtubble which it produces, and which affords a moſt excellent manure attended with no expence. It lies ready upon the ſpot; the plowing of the earth buries it; and as it is a long time in rotting, it helps to keep the ſoil looſe and light, and is repeated every year. I have found ſtubble almoſt whole at a year's end, and have ſeen ſome not quite conſumed at the end of two years. From what I have ſeen of its effects, I will venture to ſay, that it contributes greatly to increaſe the productions of the earth. I have very often plucked up plants remarkable for their beauty, and have frequently found their roots interwoven with tufts of ſtubble, which ſhewed me the cauſe of their extraordinary growth."

" It is often, ſays Mr. Duhamel, more advantageous to increaſe the fertility of land by plowing, than by dung: 1, Becauſe in general, only a certain quantity of dung can be had, the product of twenty acres being ſcarcely ſufficient to produce enough for four or five; whereas the particles of the earth may be divided and ſubdivided almoſt to infinity. The help derived from dung is therefore limitted; whilſt no bounds can be ſet to the benefits that may accure from plowing.

" 2, Few plants raiſed in dung ever have the fine flavour of thoſe which grow in a good ſoil moderately dunged. Our kitchen gardens and our other grounds afford daily inſtances of this truth. Pulſe, pot-herbs, and fruit, are ſeldom ſo good in the neighbourhood of great cities, where dung abounds, as in country gardens, where but little of it is uſed. The corn raiſed in thoſe exceſſively dunged lands, yields a great deal of bran, and not much fine flour, and is difficult to keep. Nice horſes will not eat oats of the growth of fields manured with human ordure. But nothing is ſo ſtriking as the difference between the wine of an undunged vineyard, and that of vines which have been greatly dunged.

" 3, Dung, which is ſuppoſed to act by fermentation, cauſes indeed an inward diviſion of the particles of the earth, which muſt be very uſeful, as well as the food which it furniſhes to plants: but the plough, beſides dividing thoſe particles, changes their ſituation, and turns the ground upſide down, ſo that the part which was expoſed to the influences of the air and dews, takes the place of another part, which is brought from within the earth, up to its ſurface. The conſequence of this is, that well-ploughed land is not exhauſted by weeds, and that it admits the moiſture of rains and dews, together with the rays of the ſun, all of which contribute greatly to render it fertile, as has been proved by very many experiments.

" 4, Dung attracts inſects, and thoſe inſects gnaw plants. It is well known that the roots of trees planted in dunged ground, are very liable to be damaged by inſects; and this is one of the chief reaſons why floriſts baniſh dung from their gardens. Worms, grubs, and other ſuch like vermin, make dreadful havock in their beds of flowers; and I have ſeen meadows where the graſs has been entirely deſtroyed, by their eating its roots.

" I muſt add, that moſt ſorts of dung contain a great many ſeeds, which fill the land with weeds.

" 5, It is true that dung is equally ſerviceable to light lands, and to ſtrong; but the ſame may be ſaid of plowing.

" Land is too ſtrong when its particles lie ſo cloſe together, that the roots of plants cannot extend between them, without great difficulty, in queſt of their neceſſary food, for want of which they will remain poor and ſickly. But when the ground has been well looſened by repeated plowings, and its particles are ſet at greater diſtances from each other, thoſe roots will be able to ſpread freely on all ſides, to pervade every minute chaſm, and to collect ſuch quantities of food, as will make the plants grow ſtrong and vigorous. The friendly influences of the atmoſphere will then penetrate to them. What plainly proves the good effects of looſening ſuch ſoils, is, that their fertility is ſometimes increaſed by a mixture of ſand, inſtead of dung. Now ſand does not afford any nutritive ſubſtance; but only hinders the particles of the earth from re-uniting too cloſely.

" Plowing is equally beneficial to light lands, for the very

very contrary reaſon; though theſe do not require ſo much of it as the other. There is no danger of their being exhauſted by any expoſure to the ſun; but, on the contrary, they acquire an additional degree of fertility by the ſtirring and grinding of their particles, and are thereby the better fitted to receive the moiſture of rains and dews, and the ſalutary influences of the air and ſun; whilſt their inward pores are at the ſame time better adapted to the proper extenſion of the roots of plants, by their being leſſened.

"But, let the benefits ariſing from dung be ever ſo great, let the means of obtaining enough of it be ever ſo eaſy, and let even its defects be corrected as much as can be; ſtill it will not be the leſs true, that frequent plowing is of infinite ſervice to land.

"For this reaſon it is, that land intended for wheat is plowed three or four times before the grain is ſowed. Some farmers, who could not dung all their lands, plowed part of them double the uſual number of times, and reaped greater crops from theſe, than from thoſe which were dunged. The expence of three plowings extraordinary will be much leſs than the price of the dung neceſſary for the land, if the farmer is obliged to purchaſe it.

"In 1759, M. Delu gave three plowings to ſome of his fields intended for oats; and though that year was very dry and unfavourable to ſpring-corn, his oats kept up well till they were perfectly ripe, and yielded a full crop of excellent grain.

"He gave five plowings to a piece of wheat-land, which had not been dunged, and, at harveſt, had taller and finer corn there, than in the neighbouring grounds which had been dunged and cultivated in the uſual way.

"In ſhort, the advantage of thorough tillage, while the plants are growing, is ſo great, that, in many places, it has been found amply to repay even the expence of digging between the rows of corn."

PLOUGH-WRIGHT, a perſon whoſe buſineſs it is to make ploughs, and other implements of huſbandry.

POA, meadow graſs, or that common ſpecies of graſs, that principally forms the green covering of our fields.

POCKET, a large ſort of bag in which wool is packed up, in order to be ſent from one part of the kingdom to the other.

POD, a term uſed to expreſs a pericarpium, conſiſting of two valves, which open from the baſe to the point, and are ſeparated by a membranaceous partition from which the ſeeds hang by a kind of minute ſtalk.

POKE, a ſack, or bag.

Hop POLES, the upright poles, or pieces of wood, round which they bind, twiſt, and ſupport themſelves. *See the article* HOP.

POLLARD, or *Pollanger*, a tree that has been frequently polled or lopped, and its top taken off.

POLE-EVIL, an abſceſs near the poll of a horſe, formed in the ſinuſes between the noll bone, and the upper moſt vertebræ of the neck.

If it proceeds from blows, bruiſes, or any external violence, at firſt bathe the ſwelling often with hot vinegar; and if the hair be fretted off with an oozing through the ſkin, make uſe of two parts of vinegar, and one of ſpirit of wine: but if there be an itching with heat and inflammation, the ſafeſt way is to bleed, and apply poultices of bread, milk, and elder flowers: this method, with a little aſſiſtance of phyſic, will frequently diſperſe the ſwelling, and prevent the evil.

But when the tumor is critical, and has all the ſigns of matter, the beſt method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and burſts of itſelf; or if opened with a knife, great care ſhould be taken to avoid the tendinous ligament, that runs along the neck under the mane: when matter is on both ſides, the opening muſt be made on each ſide, and the ligament remain undivided.

If the matter flows in great quanties, reſembles melted glue, and is of an oily conſiſtence, it will require a ſecond inciſion, eſpecially if any cavities are diſcovered by the finger or probe; theſe ſhould be opened by the knife, the orifices made depending, and the wound dreſſed with the common digeſtive of turpentine, honey, and tincture of myrrh, and after digeſtion with the precipitate ointment; or waſh the ſore with the following, made hot, and fill up the cavity with tow ſoaked in it.

Take vinegar or ſpirit of wine, half a pint, white vitriol diſſolved in ſpring water, half an ounce, tincture of myrrh, four ounces.

This may be made ſharper by adding more vitriol; but if the fleſh is very luxuriant, it ſhould be firſt pared down with a knife before the application; with this waſh alone Mr. Gibſon has cured this diſorder without any other formality of dreſſing, waſhing with it twice a day, and laying over the part a quantity of tow ſoaked in vinegar and the white of eggs beat together. This laſt application will ſerve inſtead of a bandage, as it will adhere cloſe to the poll, and come off eaſily when there is occaſion to dreſs. Some waſh with the phagædenic water, and then fill up the abſceſs with looſe doſſils of tow ſoaked in Ægyptiacum and oil of Turpentine made hot, and continue this method till the cure is effected.

But the moſt compendious method of cure, is found by obſervation to be by ſcalding, as the farriers term it, and is thus proſecuted when the ſore is foul, of a bad diſpoſition, and attended with a profuſion of matter.

Take corroſive ſublimate, verdigreaſe in fine powder, and Roman vitriol, of each two drams; green copperas half an ounce; honey or Ægyptiacum two ounces, oil of turpentine and train oil, of each eight ounces; rectified ſpirit of wine four ounces: mix together in a bottle.

Some make their ſcalding mixture milder, uſing red precipitate inſtead of the ſublimate; and white vitriol inſtead of the blue; the following has been ſucceſsfully uſed for this purpoſe, viz. half an ounce of verdigreaſe, half a pint of train oil, four ounces of oil of turpentine, and two of oil of vitriol.

The manner of ſcalding is firſt to clean the abſceſs well with a piece of ſponge dipped in vinegar; then put a ſufficient quantity of the mixture in a ladle with a ſpout, and when it is made ſcalding hot, pour it into the abſceſs, and cloſe the lips together with one or more ſtitches. This is to remain in ſeveral days, and if good matter appears, and not in an over great quantity, it will do well without any other dreſſing, but bathing with ſpirit of wine; if the matter flows in great abundance, and of a thin conſiſtence, it muſt be ſcalded again, and repeated till the matter leſſens and thickens.

Theſe liquid corroſive dreſſings agree well with horſes, whoſe fibres are ſtiff and rigid, and whoſe juices are

oily and viſcid; in this caſe they contract the veſſels of the tendons on the hind part of the head and upper part of the neck, which are continually ſpewing out a matter or ichor that can hardly be digeſted, or the profuſion abated without ſuch applications as theſe.

POND, a reſervoir or receptacle for collecting and preſerving water.

The neceſſity of water, in all paſtures, is ſelf-evident; as cattle cannot live without it, and the driving of them far for it is known to be prejudicial to their health, in hot weather, beſides being attended with great trouble, and a conſiderable loſs of time. This is ſo ſenſibly felt in many parts of England, that people are obliged to dig wells, even to ſuch a deph as, frequently, to require the aſſiſtance of a horſe to draw up the water. The means of rendering it eaſily come at, muſt therefore enhance the value of the land where it can be ſo procured, and are of very eſſential conſequence to the huſbandman.

Where the ſurface of the ground is ſand or gravel, there ſeldom is occaſion to dig deep for water; becauſe ſuch ſoils generally lie upon marle, or ſome other rich earth, through which the water cannot deſcend. Beds of clay are moſt commonly thicker than thoſe of ſand or gravel; and chalk is, too often, the thickeſt of all. But wherever water is wanting, the farmer ſhould bore through the incumbent earth, if he intends to fit his land for paſture; and if he finds the expence of obtaining it too great, his beſt way will be to convert the ground ſo circumſtanced into arable, or to plant it with timber-trees ſuited to the nature of the ſoil.

Wherever water ſtagnates in a ſandy or gravelly ſoil, the huſbandman ſees at once at what depth is the ſurface of the earth which retains it. But in other ſoils, and when this does not happen, Palladius, and the authors of the *Maiſon Ruſtique*, give the following directions how to ſeek for water, with the greateſt probability of ſucceſs.

Where ruſhes, reeds, flags, willows, and other aquatic plants grow ſpontaneouſly, or where frogs are obſerved to lie ſquatted down cloſe to the ground, in order to receive its moiſture, there generally is water underneath. Perſons who make it their buſineſs to find out ſprings for fountains, caſcades, &c. look upon it as an infallible ſign of ſubterranean water, when they ſee a vapour ariſe frequently from the ſame ſpot of ground. Others aſſure, that wherever ſwarms of little flies are ſeen conſtantly flying in the ſame place, and near to the ground, in the morning, after ſun-riſe, there certainly is water under that ſpot. Again, where water is wanted on land apparently dry, let a man before ſun-riſe, lie down flat upon his belly, reſting his chin upon his fiſt placed cloſe to the ground, that his view may be directed quite horizontally, and not riſe too high, and in that ſituation let him look ſtedfaſtly toward the eaſt. If he then ſees a tremulous vapour ariſe from any particular ſpot, let him mark the place, by noticing ſome neighbouring tree, ſhrub, or other indication, and he will find water underneath it. But this experiment is to be made only on ground whoſe ſurface is dry; becauſe other exhalations, from a damp ſurface, would be apt in this caſe, to miſlead the inquirer.

Another way is this. Dig a hole three feet wide, and at leaſt five feet deep, and place at the bottom of it, when the ſun is about to ſet, a pan, or baſon, rubbed with oil on the inſide: let the bottom of this veſſel be uppermoſt; cover it with dry hay, fern, or ruſhes, and over that with earth, and if any drops of water are found ſtanding on its inſide the next day, a ſpring is probably not far off. Or, put a new, unbaked, but well dried, earthen veſſel into ſuch a hole, and cover it as before; and if there be water in that place, this veſſel will be found ſoft and wet the next day. Likewiſe if wool be left all night in a trench of this kind, and water can be ſqueezed out of it the next day, little doubt remains but that plenty of water may be met with there.

The month of Auguſt is generally looked upon as the moſt proper time to ſearch for water; becauſe we apprehend, as the heat of the preceding ſummer will have warmed the earth to a conſiderable depth, any ſteam ariſing from water reſting on an impervious ſoil underneath, and particularly in hollows on the ſurface of that impervious ſoil, will then be moſt exhaled by this warmth. Now it is this ſteam, or vapour, which produces the before-mentioned ſigns.

By whatever method water is found, the means of coming eaſily at it are the next conſideration. If it be on a plain, there is no other way than digging a well. In doing this, the ſubſtance under the ſand or light ſoil muſt be dug into, to form a reſervoir of water for occaſional wants; and this reſervoir ſhould be made deep and large, in proportion to the quantity wanted. If there were no ſuch reſervoir, the water, after having riſen a little above the impervious body underneath, would glide along its ſurface, as uſual, and very little of it could then be obtained, either by pumps, buckets, or any other way employed to raiſe it. If the well is made in a ſloping ground, and the declivity is ſufficient to give it an horizontal vent, it will be worth the huſbandman's while to dig ſuch a paſſage, and by means of pipes, or any other conveyance, to carry the water acroſs the light ſoil, through which it would otherwiſe ſink. The greateſt quantity of water will be obtained in this manner, becauſe there will then be a continual ſtream.

If the ſoil is very deep, and its ſurface has inequalities in which rain water runs in any quantity; this may be collected in ponds made in the loweſt parts of ſuch grounds.

If a body of clay is found near the ſurface, it is worth the farmers while to bore, that he may know at what depth a bed of ſand or gravel may be met with: for he will be ſure to find plenty of water in this laſt. If this be in a declivity, he need only cut an horizontal paſſage, and the water will flow ſo freely as even to double the value of his land.

Here again the farmer needs not ever to be at a loſs, becauſe it cannot be very difficult to make a pond in a clayey ſoil, which is, of itſelf, retentive of water. But it may, perhaps, be adviſable, even in this, to cover the bottom of the pond with a coat of gravel, in order to prevent its being poached by cattle, whoſe feet would otherwiſe be apt to ſink deep into the clay. Some farmers judicioufly pave the declivity by which the cattle enter into the pond, and this renders it much more laſting than it would otherwiſe be, and preſerves the water clean.

When ponds are made in a looſe ſoil, much more care is neceſſary: The bottom and ſides there muſt be covered with a thick coat of the tougheſt clay, from a foot to two feet thick, well rammed down. Some have added hair and loam to the outer part of this covering, with a view of rendering it leſs liable to chap: but a thick coat of gravel is more neceſſary here, that the feet of the cattle may not pierce through the clay. Perhaps the expence of paving

paving the whole inside of a pond, might, in the end, be money well laid out.

The greateſt difficulty of finding water is in chalky ſoils, becauſe theſe are not, of themſelves, very retentive of it, and generally lie in ſuch thick beds, that it is expenſive to dig through them. However, it ſhould be tried; and if ſand or gravel be found underneath, water may be depended on. Even here, ponds are eaſily made, by digging into the chalk, and lining them with a coat of clay, as before directed. If there is a ſupply of proper manure, ſuch as clay, or marle, this ſituation is well adapted to grain, which loves to ſtand dry; and as this kind of ground produces more forward crops than clayey or ſtrong ſoils, it may be ſowed early with corn, which will not, in that caſe, be ſo apt to be parched up as graſs is, by the ſummer's drought. If a good ſoil can be made here, a foot deep, it will yield plenty of various ſorts of paſture, either roots or graſſes, as the farmer ſhall judge moſt proper: or it may be planted with different kinds of timber-trees. For the method of making ponds in gardens, *ſee the article* GARDEN.

POPLAR, a genus of trees, of which botaniſts enumerate four ſpecies; viz. the common white poplar, with large leaves: the common white poplar with ſmaller leaves: the common black poplar, and the poplar with trembling leaves, called the aſpen tree. The poplar, whether black or white, may be eaſily propagated, either by layers, cuttings, or ſuckers, of which the white kind always produces a great many from the roots. The beſt ſeaſon for the tranſplanting theſe ſuckers is in October, when the leaves begin to decay; and they ſhould be removed into a nurſery for two or three years, at the end of which time they will have got ſtrength enough to be tranſplanted into the places where they are to remain.

When they are to be propagated by cuttings, it is beſt to do that in February, cutting off large truncheons of eight or ten feet long; which, being thruſt down a foot deep in the ground, will take root very quickly, and, if the ſoil be moiſt, will grow to a conſiderable ſize in a few years.

The black poplar is not ſo eaſily raiſed from theſe large truncheons, but ſhould be planted in cuttings, of about a foot and a half long, planting them a foot deep in the ground. This will grow on almoſt any ſoil, but does much better on a moiſt one than on any other. They are the fitteſt of all trees for raiſing a ſhade quickly, as they will grow fourteen feet in height ſometimes in one ſeaſon, and in four or five years will be large trees.

A conſiderable advantage may be obtained by planting theſe trees upon moiſt boggy ſoils, where few other trees will thrive: many ſuch places there are in England, which do not, at preſent, bring in much money to their owners; whereas, if they were planted with theſe trees, they would, in a very few years, over-purchaſe the ground, clear of all expence: but there are many perſons in England, who think nothing, except corn, worth cultivating: or, if they plant timber, it muſt be oak, aſh, or elm; and, if their land be not proper for either of theſe, it is deemed little worth; whereas, if the nature of the ſoil was examined, and proper ſorts of plants adapted to it, there might be a very great advantage made of ſeveral large tracts of lands, which at this time lie neglected.

The wood of theſe trees, eſpecially of the white, is very good to lay for floors, where it will laſt many years: and, for its exceeding whiteneſs, is, by many perſons, preferred to oak; but being of a ſoft contexture, is very ſubject to take the impreſſion of nails, &c. which renders it leſs proper for this purpoſe: it is alſo very proper for wainſcotting of rooms, being leſs ſubject to ſwell or ſhrink, than moſt other ſorts of wood: but for turnery-ware, there is no wood equal to this for its exceeding whiteneſs, ſo that trays, bowls, and many other utenſils, are made of it; and the bellows-makers prefer it for their uſe; as do alſo the ſhoemakers, not only for heels, but alſo for the ſoles of ſhoes: it is alſo very good to make light carts; the poles are very proper to ſupport vines, hops, &c. and the lopping will afford good fuel, which in many countries is much wanted. *Miller's Gard. Dict.*

Red POPPY, or *Red-weed*. The common wild red poppy is one of the moſt miſchievous weeds the farmers are plagued with among their corn, and it is the moſt difficult to thoroughly deſtroy of almoſt any other. Its ſeed will lie a long time in land unploughed, without ever ſhooting; but they will be ſure to grow with every crop of corn. Mr. Tull gives an inſtance of the ſeeds of this plant being buried four and twenty years in a field of ſainfoin, and at the end of that time, the land being ploughed for wheat, they all grew up among the corn, though they had lain dormant ſo long before. *Tull's Horſe-hoeing Huſbandry.*

POTATOE, or POTATO, the name of a well known plant, the roots of which make a very nouriſhing food.

Mr. Houghton deſcribes the potato to be a bacciferous herb, with eſculent roots, bearing winged leaves and a belled flower; and ſays, that according to his information, which is allowed to be very right in this reſpect, it was firſt brought from Virginia, by Sir Walter Raleigh, who, ſtopping at Ireland, about the year 1623, gave away a number of theſe roots, which were planted there, and multiplied ſo exceedingly, that, in the wars which happened afterwards in that country, when all the corn above ground was deſtroyed, potatoes became the chief ſupport of the people: for the ſoldiers, unleſs they had dug up all the ground where they grew, and almoſt ſifted it, could not have extirpated them. The Philoſophical Tranſactions obſerve likewiſe, that the Iriſh were relieved from their laſt ſevere famine, which laſted two years, during which all their corn failed, merely by the help of this root. From Ireland it was brought to Lancaſhire, now famous for its potatoes: and the culture of this plant has, within theſe laſt thirty years, been extended to almoſt every part of England. The rich, who, at firſt, deemed them fit for none but the meaner ſort of people, now eſteem them ſo much, that Mr. Miller thinks the quantity of them which is cultivated around London only, exceeds that of any other part of Europe.

The red rooted potatoes have purpliſh flowers, and the white rooted (for Mr. Miller diſtinguiſhes only theſe two general varieties) bear white flowers.

The potatoe ſeldom perfects its ſeeds in England; and if it did, the raiſing of it from them would be much more tedious and uncertain than propagating it by its roots, as is the general and right method: for theſe multiply exceedingly, and may be made to yield vaſt crops, with little coſt or labour.

"The Iriſh huſbandman, ſays Mr. Switzer, after blaming the Engliſh for planting this root uncut, becauſe it often contains five or ſix eyes, or perhaps more, from which the produce of the enſuing year is to ſpring; and alſo for not allowing that bulb, or rather the great number of ſhoots

and

and bulbs that proceed from it, a ſpace of earth ſufficient for their nouriſhment, which is the reaſon why ſo many poor, ſtinted, unſerviceable potatoes are dug up in the autumn, relates the practice of his country, which is to chuſe middle ſized roots, for the largeſt are generally eaten, to ſingle out the eyes that ſeem ſtrongeſt and moſt vigorous, and to cut them out in ſquares of at leaſt half an inch every way: ſo that one root will ſometimes furniſh three or four good pieces to ſet.

"The ground, prepared for planting, is marked out for beds four or five feet wide, with intermediate alleys of two or three feet. It is then trenched, only a ſingle ſpit deep, and the bottom of this trench, made as in common garden-trenching, is covered with dung, long and ſhort, taken out of a wheel-barrow which ſtands at the labourer's elbow. The potatoe-eyes cut as before directed, are placed upon this dung, at about five or ſix inches aſunder; and this trench is filled up with the mould taken out of the next, which is marked by a line at the diſtance of two or three feet. This trench is again filled with the mould of the next, and ſo on to the laſt, which is filled from the alley.

"The uſe of the dung thus laid at the bottom of the trenches, is not only to make the roots grow ſingle, for not above one root, or at moſt two, will in this caſe be produced by each eye, and theſe will be large and well fed; but it is attended with the farther advantage of making the potatoes run, and ſpread themſelves to a certain determinate depth, which is no ſmall help to their growing large.

"The laſt thing to be done to them is, in April or May (for they are planted in February or March) as ſoon as they begin to riſe, to dig the earth out of the alleys, as is done for aſparagus, and to cover the potatoe bed with it, about five or ſix inches thick. This will give new life and vigour to the roots, will keep the green from running too much to haulm, and will make the bulbs grow much the larger. By this means the crop of fine large potatoes will be almoſt the double of what is obtained when they are planted promiſcuouſly in the common way: nor will any farther culture be requiſite till they are fit to be dug up; except the pulling out ſome of the largeſt weeds."

Mr. Miller's reaſons for diſapproving of the planting, either of the ſmall offsets entire, or the eyes cut out of larger roots, are, that though the former generally produce a greater number of roots, theſe roots are always ſmall; and that the cuttings of the larger roots are apt to rot, eſpecially if wet weather happens ſoon after they are planted. He therefore recommends, to make choice of the faireſt roots for ſetting, and to allow them a larger ſpace of ground, both between the rows, and between the plants in the rows; and he aſſures us that he has obſerved, when this method has been followed, that the roots, in general, have been large the following autumn. M. Duhamel, in his Elements of Agriculture, does not object at all to the planting of the cuttings.

The ſoil in which this plant thrives beſt, is a light ſandy loam, neither too dry nor over moiſt, but brought to a fine tilth, and ploughed very deep: for the deeper the earth is looſened, the finer and larger the roots will grow. In the ſpring, juſt before the laſt ploughing (according to Mr. Miller's method) a good quantity of rotten dung ſhould be ſpread on the ground, and this ſhould be ploughed in early in March, if the ſeaſon be mild; otherwiſe it had better be deferred until the middle or latter end of that month; for if a hard froſt ſhould come on ſoon after the roots are planted, they may be greatly injured, if not deſtroyed, thereby; but if they can be planted in the ſpring, without that danger, the better it will be.

The laſt ploughing ſhould lay the ground even, and then furrows ſhould be drawn three feet aſunder, and ſeven or eight inches deep. The roots ſhould be laid at the bottom of theſe furrows, about a foot and a half aſunder, and they ſhould then be covered in with earth.

After all the ground intended for potatoes is planted in this manner, it muſt remain in the ſame ſtate till near the time when the ſhoots are expected to appear; then it ſhould be well harrowed both ways, as well to looſen the ſurface and render it ſmooth, as to tear up the young weeds which will have begun to grow by that time. If much wet has fallen after the planting, it may have caked the ſurface of the earth, ſo as to retard the ſprouting of the plants; and this harrowing will, in ſuch caſe, almoſt anſwer the intent of a firſt hoeing.

I have placed the rows of potatoes at three feet diſtance, continues Mr. Miller, in order to introduce the hoe-plough between them; becauſe that will greatly improve their roots: for by twice ſtirring and breaking of the ground between theſe plants, not only weeds will be deſtroyed, but the ſoil will be ſo looſened, that every ſhower of rain will penetrate to the roots, and greatly quicken their growth. But theſe operations ſhould be performed early in the ſeaſon, before the ſtems or branches of the plants begin to fall and trail upon the ground: for after that, it cannot be done without injuring the ſhoots.

If theſe hoe ploughings are carefully performed, they will prevent the growth of weeds, till the haulm of the plants cover the ground; and after that there will be little danger of their growing ſo as to injure the crop; for the haulm will keep them under: but as the horſe-hoe can only go between the rows, it will be neceſſary to make uſe of a hand-hoe to ſtir the ground, and deſtroy the weeds in the rows, between the plants. If this is well done, in dry weather, immediately after each of the two horſe-hoeings, it will be ſufficient to keep the ground clean until the potatoes are fit to be taken up; which will be, very ſoon after the firſt froſt in the autumn has killed the haulm. They ſhould not remain much longer in the earth, leſt the roots themſelves be froſt-bitten, which ſpoils them. A four or five pronged fork is better to dig them up with, than a ſpade, becauſe it is leſs apt to cut them: but a principal thing to be conſidered here, is the clearing of the ground thoroughly of them: for if any are left, they will ſhoot up among the next crop, whatever it be, and do conſiderable damage, eſpecially if it be wheat, as is generally the caſe, ſown in the common broad-caſt way.

The beſt way of keeping theſe roots during the winter, is to lay them up in a dry place in very dry ſand, or in fine and perfectly dry earth.

The method of laying dung only at the bottom of the furrows in which the roots are planted, "is a very poor one, ſays Mr. Miller, becauſe, where the potatoes begin to puſh out their roots, they are ſoon extended beyond the width of theſe furrows, and the new roots are commonly formed at a diſtance from the old: ſo will be out of the reach of this dung, and conſequently will receive little benefit from it." But rather the contrary would ſeem to be the caſe, according to the Iriſh huſbandman, who, ſeems to ſpeak from experience, when he ſays, he had intended expreſsly to anſwer this very objection, that "the dung is placed at the bottom of the furrows on purpoſe to make

make the roots grow ſingle; and that its being ſo placed is attended with the farther conveniency of making the potatoes run, and ſpread themſelves at a certain determinate depth, which is no ſmall help to their growing large." Facts muſt here determine which is right: as they alſo muſt in regard to ſome parts of what Mr. Miller adds in the following words. "As moſt farmers covet to have a crop of wheat after the potatoes are taken off the ground, ſo the land will not be ſo thoroughly dreſſed in every part, nor ſo proper for this crop, as when the dung is equally ſpread and plowed in all over the land, nor will the crops of potatoes be ſo good. I have always obſerved, where this method of planting the potatoes has been practiſed, the land has produced a fine crop of wheat afterward, and there has ſcarce one ſhoot of the potatoe appeared among the wheat, which I attribute to the farmers planting only the largeſt roots: for when they have forked them out of the ground the following autumn, there have been ſix, eight, or ten large roots produced from each, and often many more, and ſcarce any very ſmall roots; whereas in ſuch places where the ſmall roots have been planted, there has been a vaſt number of very ſmall roots produced, many of which were ſo ſmall, as not to be diſcovered when the roots were taken up; ſo have grown the following ſeaſon, and have greatly injured whatever crop was on the ground."

Will not a thorough plowing and good harrowing, after the crop of potatoes has been taken off the ground, intermix the dung laid in the furrows, and the contiguous earth moſt impregnated thereby, with the reſt of the ſoil, perhaps almoſt as well as if the dung had been ſpread equally over the whole field, at the very firſt? If it will, the preſumption ſeems ſtrong in favour of the Iriſh method. For certain it is, that the land ought to be well plowed and harrowed after the potatoes are removed, before it is ſown with any other crop; unleſs the ſeed for that crop, which generally is wheat, be ſprinkled by hand between the rows, as they are dug up, and there covered with the earth then turned over. This is practiſed in ſome parts of France; but, as M. Duhamel obſerves, the grain is ſo apt to be diſtributed unequally in this method, that it is better to plow the ground, and ſow it, in the regular way.

If the farmer apprehends that his land has not been thoroughly cleared of the potatoes, and is therefore afraid of their damaging his enſuing crop, his beſt way will be to lay it up very rough againſt winter; becauſe the froſts of that ſeaſon are known to kill and rot all potatoes in the ground expoſed to them, and it will at the ſame time be thereby finely prepared for ſpring corn; eſpecially as it will have been well enriched by the haulm of the potatoes lying upon it.

Though potatoes delight moſt in a light ſandy loam, neither too dry, nor over moiſt, as was obſerved before; yet Mr. Maxwell ſays he has ſeen them thrive well on ground that ſeemed to be very bad; even in deep moſs, which could not bear horſes to plow it, but which is conſiderably bettered by them; and on coarſe heath, where they were ſucceeded by grain, without more dung than was laid on at firſt. Of ſo improving a nature are they, and ſo much is the land enriched by the rotting of their ſtalks among it, and the digging it gets in raiſing them.

Several experiments communicated to M. Duhamel concur to prove the extraordinary increaſe of potatoes cultivated with the horſe-hoe: but as this will always be the conſequence of the New Huſbandry, whenever it is properly uſed, I ſhall only borrow from him, on this occaſion, M. de Viller's account of his method of practice, becauſe it is the cleareſt and moſt conciſe.

"There are, ſays he, ſeveral ſorts of potatoes, That which I cultivate is the middle ſized. It is planted about the end of April, or the beginning of May, and it ripens in October. My beds are five feet wide. I give them two plowings in the ſpring; at the ſecond of which I half fill the main furrow. Before I plant, I cut a ſmall furrow with the ſingle cultivator, which likewiſe looſens the earth; but if it be moiſt, I put a double ſpring-tree bar to the cultivator, to avoid the poaching of the horſes. I then plant the potatoes a foot aſunder in the row, chooſing for this purpoſe ſuch as are about the ſize of a walnut. They are thruſt in by hand, two or three inches deep; and if the mould does not then cover them ſufficiently of its own accord, a little more is puſhed down upon them.

"A ſlight hand-hoeing can hardly be avoided afterwards, to deſtroy the weeds which ſpring up at the ſame time as the potatoes: but this hoeing need not extend farther than three or four inches on each ſide of the row; becauſe the plow will do the reſt.

"I give the firſt hoe-plowing in the ſpring, as for wheat; but earlier or later, according to the condition of the ground.

"My ſecond hoe-plowing is given as ſoon as the plants are tall enough to be earthed up; that is to ſay, when they are eight or ten inches high. I then turn the earth up towards them as much as poſſible.

"As this plant ſpreads greatly, and ſhoots out very faſt, it would be impoſſible to give more than two of theſe hoeings, if one ſhould neglect to take advantage of the time when its leaves and branches do not entirely cover the bed.

"The roots are dug up in October, or perhaps ſomewhat earlier or later, according to the ſeaſon, with a ſtrong iron prong; ſhaking and clearing them well from the mould. They are then left to dry for ſome hours, and are afterwards laid up in a place where the froſt cannot reach them.

"This fruit, which yields ſurpriſingly, is of great ſervice to feed and fatten cattle, eſpecially when it has been boiled a little. They like it very well raw, after it has been kept a few months above ground: but it is beſt for them after it has been boiled."

The reader is obliged to the ingenious Mr. Irwin for the following account of cultivating potatoes in Ireland, and which we ſhall give in his own words.

"The potato, ſays he, is become a root of ſuch immenſe utility, eſpecially to the poorer ſort, within this centuary, that too much methinks, cannot be ſaid towards improving, and extending the culture of it.

"In Provence, Dauphiny, Switzerland, and ſeveral other parts of Europe, and even in America, it yields commodious, abundant relief to the more indigent, as being eaſily and plenteouſly propagated in almoſt every kind of ſoil.

"In Ireland particularly it is the principal food of the poor during the greater part of the year, without which, ſince the late unproportionable riſe of lands in that kingdom, to the trade of it, they could not well ſubſiſt. And,

indeed, it ſeems a particular favour of providence ſent to them on this account.

" In times, not very remote, lands were cheap there, and the peaſantry, conſequently, lived on nouriſhment ſomewhat more luxurious, diverſified: their labour alſo was leſs burthenſome. But now, being obliged to work hard at four-pence and ſix-pence a day, and their rents conſiderably augmented, it will not ſeem ſurpriſing that this root alone has became the ſtaple of their ſupport, and that they have been the firſt people in Europe, or, perhaps, in the world, that have led the example in an extenſive improvement of it. This may naturally be ſuppoſed to ariſe from cloſe-preſſing neceſſity, the moſt cogent and inſpiriting of all motives.

" In truth, with much reaſon; for a poor labourer, in that ill-fated country, is driven to ſeek his ſole refuge for ſubſiſtance in this root, for the inexorable impoſition of a hard-hearted landlord, (ſorry I am to have it to ſay, too many of them grind the poor; but hope it will not be long the caſe) who thinks he cannot get too much for his land out of the perſons, or purſes, of his dependents, and who hath ſo inverted the old cuſtoms, that a hewer of wood, and drawer of water, (and many of theſe perhaps deſcendants of former proprietors) can afford himſelf but a miſerable ſcanty platter of potatoes, ſeaſoned with a palatable grain of ſalt, and waſhed down with a draught from the next rivulet, to ſupport the fatigue of thirteen hours (ſtatute quantity) of unceaſing labour, about his ancient manſion-houſe, or in his elegant gardens, well-laid out cloſes, or refreſhing bog-holes.

" The potato is a root; a little of which is very filling, quickly appeaſing hunger; but by no means a laſting ſolid nouriſhment for a labourer, as evidently teſtify the ſqualid looks of numbers of the poorer Iriſh; though at the ſame time it is in general wholeſome, agreeing with moſt ſtomachs that can vary their food; but like other productions of the earth, forbid in many caſes by the medicinal tribe.

" There are ſeveral ways of breeding potatoes in Ireland, which partly ariſes from the difference in ſoil, and kinds of ſeed. The different ſoils for this purpoſe in uſe in my neighbourhood, for about twenty years paſt, and which, I believe, are pretty general, are the following, wherein they are abundantly propogated, viz.

" Firſt, On rich clay land without any manure, vulgarly called graſs potatoes.

" When a leaſe is near being expired, that is, during the laſt ſeven years of it, if there be no covenants grounded on the ſtatute againſt waſte, &c. the tenant, finding no hopes of a renewal, ſets conſiderable tracts in this way, where the ſoil will admit of it.

" Secondly, On good ley land well gravelled, (otherwiſe ſanded) which ought to be done a year before planting. But the poorer ſort, who are the chief cultivators of this root, are obliged to ſand and plant at the ſame time, or nearly thereabouts; which is very deſtructive to themſelves, their potatoes not having the proper benefit of the manure; at leaſt one part in three of the return are on this account exceeding ſmall, and are from hence called poreens by them, being a diminutive expreſſion. Whole fields are ſet in this way, commonly called ſpaddane, in which a conſiderable trade is driven; eſpecially in the provinces of Munſter and Connaught.

" Had it been properly and moderately done, it would be a fine preparation for the encreaſe of corn, and the laying down and bringing in, or, in other terms, the reclaiming of land; but the poor do it ſo negligently, and mangle it ſo intolerably, having but a ſhort temporary uſe in it, beſides paying near double the worth of it, that this manufacture, which might otherwiſe be of conſiderable benefit to Ireland, is, as now carried on, rather the contrary.

" Thirdly, On ground previouſly gravelled (that is perhaps ſix months before) and dunged at ſetting time. There is but little done in this way, except by the gentry, and renters of land for their own private uſe; it being as yet out of reach of the peaſantry, unleſs in a few inſtances.

" Fourthly, On the ley with dung alone. Marle is not in uſe in my neighbourhood, though there is plenty of it in ſeveral parts of it; therefore cannot yet inform you how it would do for the potatoes in that diſtrict. As to potatoes ſet in the ley with dung alone, this manufacture alſo is done, as you may judge, moſtly by the more opulent. I have, however, often ſeen large fields ſet in this way to the public; but it is not of late years ſo much the cuſtom, this ſort of land being commonly kept for grazing: this hurts the land; and any preparation out of the ley for potatoes will, if not previouſly gravelled.

" Fifthly, In a rable or ſtubble land, vulgarly called ſticking or thruſting of potatoes, becauſe they are ſown with a ſtick, pointed at the end, about an inch diameter, and two feet long, with the loy (otherwiſe the Iriſh ſpade) In this method dung is alſo uſed, which ſhall be noticed in loco.

" Theſe are the moſt general methods that now occur to me, or I believe that are in uſe. There are, however, ſome others ariſing from the quality of the ſeed, practiſed only by the curious, in which the plants are put down at nine or twelve inches aſunder every way, in little hillocks (like the hop plant) as practiſed in ſeveral counties in England; and, if you land them at certain proper ſtated times while vegetation continues, you will have a handſome neſt of large oblong potatoes at every landing.

" I made the experiment of one ſort in my garden; and out of half a dozen potatoes cut into ſeveral pieces, each having an eye, I had, to the beſt of my remembrance, without exaggeration, a quantity nearly equal to twelve Wincheſter buſhels.

" This kind of potato is introduced into Ireland but of late years: it is however well known there.

" A potato entirely black is alſo in uſe in Fingal, near Dublin, fructifies abundantly, and eats exceeding dry, which principally marks the goodneſs of this root in almoſt every inſtance.

" There are ſeveral kinds of potatoes. Mr. Maxwell of Arkland in Scotland, a very judicious gentleman, has particularly noticed ſix ſorts, viz. The long red, the round red; the long white, the round white, or Spaniſh potato; the blue, the leather-coat, and an early kind that comes in a month ſooner than the common ſort, though planted at the ſame time.

" This root being greatly manufactured in Ireland, they mix moſt of the better ſorts promiſcuouſly, both for uſe and ſeed.

" I remember, about twenty-five years ago, the large red potato; then called the Caſtonian, (perhaps from Caſtile) as alſo the oblong Spaniſh white potato, to be chiefly in uſe; but now a leſſer ſort, ſuch as the Munſter or kidney potato, of a whitiſh or lightiſh yellow colour, the

the leather-coat, or round red Cronian potato, with a rough thick skin, and particularly that stiled the Spanish white potato, are mostly in use.

"All these sorts are cut for seed, according to the number of eyes on them, and thrive generally well with very little care; so that all sorts being now so plenty, and answering so well, there are (as we may easily judge) no over nice distinction made about them there. The poorer Irish, who affect not to plant this root in bottom lands, or wet swampy grounds, unless hard pressed for soil, are even in this case seldom attentive about the kind of potato they put down, the return being commonly wet, unfit for eating, and only proper for seed, which (from my little experience) I think makes but indifferent, though sown in the best prepared upland; for too much moisture, as well as too much dung, makes a potato wet: and plant it when you will, I am apprehensive it never loses this quality, which is the worst it can have, except being rotten, or frost-bit: nor will any eat so well, raised from dung, as without.

"As the potato thrives in different soils, so there are different methods of cultivating it: I will therefore now proceed to that most generally in use in my neighbourhood, (and indeed all over the kingdom) called grass potatoes or spaddane, and by some (improperly) con-acres, which seems to be the natural culture, but doubtless not so good to make the land stand long proof, (notwithstanding the gravelling) as if artificial manures were added, such as dung, compost, lime, &c. for marle, lime-stone, gravel, sea-sand, shells, &c. I consider in the class of natural manures and the best; and providence hath kindly given them in every spot, (even in the unpromising deserts of Zara, &c.) had we known how to come at them.

"Land in the ley, (as I said before) and that which requires no manure, the Irish seek most greedily after; some of which has not been ploughed perhaps within this century: so that you can only just distinguish that it has been tilled, and that the tilth generally curved, the old people inclining the plough with the casual shape of the field, so as to let the water in the furrow have a drip or a fall.

"When a peasant has the good luck to get a bit of such choice ground, (for two or three of them will be concerned in an acre, and few take more than one) he follows the old ridge with his loy, or Irish spade, unless compelled by the possessor of the land to make his ridges strait, which he most unwillingly does, and at best but awkwardly, with a rope made of hay or straw, or some of his wife's worst tow; neither of which stretching right, and often breaking, seldom admit well-looking ridges: these he makes from one end of his ground to the other, the beds being about three, or at most four feet wide, and the furrows or trenches, about two. When he deposits the seed on his bed, at about four or six inches at most asunder, he divides the turf of his furrow into two equal parts, which he turns alternately in sods on the edge or verge of each bed, the green side on the potatoes, cutting the sods on three sides or angles, leaving that next the bed uncut. This laborious work the poor fellow does surprizingly quick: two more men follow him, one digging the under stratum, and throwing up on the middle of the bed as much of the earth as he conveniently can with his loy: the remainder the third man casts on with his shovel, settling the bed in the form, or manner, in which it is to remain.

"Some cover their potatoes at first (thro' want of time) with only the sod, and about four or five inches of earth, and finish them perhaps, that is, cast the last covering on them, not for a month, or six weeks after; which possibly may greatly check their growth. Many account this the best way, and it is become common; but I attribute the neglect of not finishing their potatoes, (as the term is) in due time, to no want of proper knowledge in the common Irish, but their inability to give the proper attention to their own little affairs, occasioned by the greedy severity of their masters, as before observed.

"Others there are (and many) who, making the furrows unproportionably narrow to the beds, throw up a third spit or stratum, and perhaps not until two months after the first setting.

"This pernicious method may possibly destroy, or check the weeds; but certain I am, it will not contribute to the increase or largeness of the root, in the unphysical or over heavy manner in which I have seen it done; because this lower stratum, which is mostly sand, remains on the top of the richest part of the soil, and being thus unmixed with it, prevents it from receiving the proper benefits of the air, &c. besides, too great a covering on the potato is highly prejudicial to it.

"In other cases, these stratums thrown up, and mixed into a good tilth, would answer wonderfully, mixing well, being the life of good tillage. I would therefore in this place recommend to our farmers (who are too penurious of their land) to make their potato trenches so wide, as not to require throwing up much of the third or sandy stratum on the last covering, or landing of their potatoes: and they will find a much greater return, and one half (or more) less of poreens, or small potatoes: which is an object highly worthy of their notice. The experiments I have made, I purpose repeating on my return to Ireland, and hope to prove this simple method to exceed that in the hillock, or in the drill way.

"In this manner all ley land is sown with potatoes by the common people, and most others, whether manured or not. If dunged, the dung is laid out as the ridges are to be, but the sand is spread all over the surface. Commonly little boys and girls precede the setters on the ridges, laying down the seedlings or potato eyes, which they do very quick and tolerably well, at the appointed distance. This seems a giddy part of their business, and well suited to their years; but custom makes them perfect in it.

"The next general method is planting potatoes in stubble ground, which is, in the common way above-mentioned, by dunging it well, and sometimes by ploughing it in, and then shovelling up the ridges, a man going before lightly digging them, that there may be a sufficient quantity of mould to cover them; but this the poorer sort cannot well compass to do, and always avoid it when they can get a fresh or ley surface.

"Nor do they sow them to chuse, the second year, in the same ground, without dung or some other artificial manure, (for the natural, such as sand, marle, &c. would not do) unless it be exceeding good.

"Lime, indeed, in this case will very probably answer, but it is rarely tried.

"There is also a custom a good deal in use, which is

by ſticking or thruſting potatoes in ſtubble land freſh ploughed, which is done in this manner: a man (but ſeldom two) goes on the crown of a narrow ploughed ſet, and ſticks his loy, or Iriſh ſpade, in it, every here and there, with his right foot, holding it in his left hand, and with it puſhing the ſpade once, and ſometimes twice from him, to make an opening, (which I have ſeen done with a great deal of dexterity) and with the right hand, that contains the ſeed, (a convenient quantity of which he carries in an apron, or cloth, tied round his middle, ſo as to let the contents be eaſily come at) he throws one, and ſometimes two ſets, or eyes, into the opening which the loy makes behind; and on his drawing it away, the looſened earth falls in and covers them. Soon after he dungs the ridges, and covers them up, as in the preceding method, with mould out of the furrows.

"Sometimes alſo they do this work with a ſtick about eighteen inches long, and an inch or ſo diameter, pointed at one end, and ſomewhat curved at the other. By this eaſy means huſband, wife, children, and ſervants, (if they have any) and a friendly neighbour or two, (who may be helped in return) aſſiſt at it for greater expedition, eſpecially when the ſeaſon happens to be advanced.

"In Scotland they do this work ſomewhat differently.

"In Ireland alſo there are many, who ſow potatoes after the plough, the ploughman letting the ſets drop in as he goes along; and a harrow matched to the ſame plough, following him cloſe behind, covers them in. There is no great difficulty in this, the land being in tilth. Over all they put dung; but they ſhould mind to give it a light covering, that the ſubſtance of it might impregnate with the adjacent earth, which it would not do, but evaporate by being left expoſed to the air, &c. yet this precaution many are very negligent in.

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"About me, and in many other parts, they very commonly do not put on the firſt covering till about the middle of May; and the ſecond, perhaps, not for a month after; ſo that it is often July before they fence them properly: and where many of them are concerned in a plantation (as is uſually the way) it is moſt troubleſome and difficult to get each man to do his part of ditching, which commonly is but a ſorry mound of ſods, with ſome buſhes ſodded down on top, to keep out ſheep, that ſmell this plant when it riſes (as cattle do corn) and are very dexterous in getting at it.

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"Of late years the hard-hearted ſky-farmers, that is the inferior ſort, and even ſome of our gentlemen farmers, drive the poor into the mountains, moory grounds, wooded and ſtony lands, and even into the bogs; and when, by the culture of the potato principally, they have reclaimed them, ſo as to be fit to admit cattle, they are turned out without ceremony. I have in ſuch places ſeen as fine crops of potatoes, and afterwards flax, and different kinds of corn, as I ever met with any where.

"The mountain and other ſurfaces, except bog, ſeldom fail being bleſſed by nature with lime-ſtone, gravel, (which is the commoneſt) or ſome other manure, adapted to them; ſo that it is nothing but hands, money, and a proper limitation of the grazing farming, that are wanting to make almoſt the whole kingdom look like a garden, or like England; I need go no higher with the compariſon.

"It is true, in ſome few counties of Ireland, in particular diſtricts, nature either has not been ſo bountiful, or the farmers have not found out the internal manures; being obliged to carry ſea-ſand, and other ſorts, many miles; in which however they find their account, notwithſtanding the impolitically too much limited trade of the kingdom.

"Before I diſmiſs this ſubject, it may be proper to obſerve, that a ſecond crop of potatoes is ſometimes taken out of the ſame land ſucceſſively; but this is not common, at leaſt about me, though I believe the land is as good as any in the province. On the contrary, the uſual way is, after the firſt crop of potatoes is taken off, if the ſoil is ſtrong, they immediately ſow bere in it, or keep it till the following ſpring for flax, which requires an equally ſtrong ſoil: or if the ground be but of a middling good ſort, they ſow it, juſt after the potatoes are taken out, with wheat, or keep it till the April following for barley.

"The ſky farmer generally takes the land into his own hands after the firſt crop of potatoes, and ſows it with bere, wheat, or barley, for two or three ſeaſons; after which, if he refreſhes it with a ſummer, or a winter fallow, he ſows the ſaid kinds of grain in it for two or three ſeaſons more; then he takes two or three crops of oats; and when it is well impoveriſhed, or drawn (as they call it there) he lets it for ſeveral years together, in con-acres, to the poor people, for at leaſt one third more than the real value.

"From hence we may judge how much an alteration of method in huſbandry is wanting in thoſe parts."

Mr. Irwin is certainly right in ſaying, that lime would very agreeably anſwer; for in the Iſle of Man, though they are no farmers, yet they cultivate exceeding fine potatoes, as they are their principal food.

Some bring in different ſorts of land by the means of them: in moory ground, after the heath is burnt off it, they mark out the beds, upon which they ſpread out the lime in near about the ſame quantity that is required in liming ground, or rather more; upon which they lay the ſeed in the uſual manner, and, after cutting the turf in the furrow, lay it on the verge of the bed with the heathy ſide undermoſt, and cover them over with the mould out of the furrow in the common method.

After coming up, they weed, or give them a ſlight covering to keep down the weeds.

When they raiſe them, it takes a little more labour; yet while they are digging a crop of very fine dry potatoes, they are gaining a piece of ground, which was before uſeleſs, and making it fit for ploughing and bearing corn the year following.

Lime is found alſo to be of excellent ſervice to potatoes in cold ſour land, which they manage after the ſame manner, and reap potatoes greatly excelling thoſe without lime, on the ſame ground.

Lime is certainly a very fine manure for potatoes: they uſe it in the iſle above-mentioned without any other thing, on all ſorts of land, even upon a light, rich, lime-ſtone ſoil; and it betters the quality of the potatoe ſurprizingly: beſides fermenting and meliorating the ſoil, it has the property of attracting and abſorbing any cold ſour matter which may be prejudicial to vegetation.

About Caſtletown, in the ſame iſle, they take a great deal of care in their culture of potatoes, and their product pays them very well for their trouble.

After marking out the bed with their ſpade, and ſpreading on the dung, or lime, they begin at one end, and dig acroſs the bed, making it a ſpadeful, all along, higher than the neighbouring ground.

Then they dig and caſt the mould out of the furrows upon the bed, in the common method; and after finiſhing it, they, with a kind of dibble, or ſhaft of a ſpade ſhod with iron, ſome round and ſharp, others ſquare, about three or four inches broad, plant in the ſeed, about ſix or more inches diſtance from one another; and when they come up above ground, they weed them as clean as a garden, and after they are ſtronger and higher, with a hoe earth up the mould about the ſtalks; by which they kill the weeds and have exceeding fine potates.

This excellent root is very valuable on ſeveral accounts.

1. It is eſteemed, and now very generally uſed at the tables of perſons of all ranks; and ineſtimable for the poor, being a cheap and very wholeſome food.

2. It is good for ſeveral ſorts of cattle, particularly for hogs, either for food or fattening them.

3. It is one of the greateſt improvers of land, whether new broke up, or preparatory to any other crop; and is in itſelf very valuable for the crop it produces. It is ſo likewiſe from another circumſtance, viz. That it refuſes no kind of ſoil, if not very wet, but will grow to conſiderable profit on drained bogs, heaths, or waſte lands; and is of very eaſy culture.

Potatoes are ſo generally cultivated in Ireland, particularly in the province of Munſter, that they are the principal, and almoſt the only food of the poor there, for almoſt eight months in the year. They do not eſteem the roots for being very large, which they cannot be in their manner of planting; for they cut the roots into as many pieces commonly, as the potatoe has eyes or buds; one bud to each piece, and ſet them in the ground ſingly with a dibble, about eight or nine inches diſtant every way. Sometimes they cut them in ſlices, not ſo thick as a crown-piece, with an eye to each ſlice; and, in general, are not ſollicitous to leave much of the potato to each eye; which, with cloſe planting, renders the potatoes commonly ſmall, and but few large ones among them.

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"Of late years the hard-hearted ſky-farmers, that is the inferior ſort, and even ſome of our gentlemen farmers, drive the poor into the mountains, moory grounds, wooded and ſtony lands, and even into the bogs; and when, by the culture of the potato principally, they have reclaimed them, ſo as to be fit to admit cattle, they are turned out without ceremony. I have in ſuch places ſeen as fine crops of potatoes, and afterwards flax, and different kinds of corn, as I ever met with any where.

"The mountain and other ſurfaces, except bog, ſeldom fail being bleſſed by nature with lime-ſtone, gravel, (which is the commoneſt) or ſome other manure, adapted to them; ſo that it is nothing but hands, money, and a proper limitation of the grazing farming, that are wanting to make almoſt the whole kingdom look like a garden, or like England; I need go no higher with the compariſon.

"It is true, in ſome few counties of Ireland, in particular diſtricts, nature either has not been ſo bountiful, or the farmers have not found out the internal manures; being obliged to carry ſea-ſand, and other ſorts, many miles; in which however they find their account, notwithſtanding the impolitically too much limited trade of the kingdom.

"Before I diſmiſs this ſubject, it may be proper to obſerve, that a ſecond crop of potatoes is ſometimes taken out of the ſame land ſucceſſively; but this is not common, at leaſt about me, though I believe the land is as good as any in the province. On the contrary, the uſual way is, after the firſt crop of potatoes is taken off, if the ſoil is ſtrong, they immediately ſow bere in it, or keep it till the following ſpring for flax, which requires an equally ſtrong ſoil: or if the ground be but of a middling good ſort, they ſow it, juſt after the potatoes are taken out, with wheat, or keep it till the April following for barley.

"The ſky farmer generally takes the land into his own hands after the firſt crop of potatoes, and ſows it with bere, wheat, or barley, for two or three ſeaſons; after which, if he refreſhes it with a ſummer, or a winter fallow, he ſows the ſaid kinds of grain in it for two or three ſeaſons more; then he takes two or three crops of oats; and when it is well impoveriſhed, or drawn (as they call it there) he lets it for ſeveral years together, in con-acres, to the poor people, for at leaſt one third more than the real value.

"From hence we may judge how much an alteration of method in huſbandry is wanting in thoſe parts."

Mr. Irwin is certainly right in ſaying, that lime would very agreeably anſwer; for in the Iſle of Man, though they are no farmers, yet they cultivate exceeding fine potatoes, as they are their principal food.

Some bring in different ſorts of land by the means of them: in moory ground, after the heath is burnt off it, they mark out the beds, upon which they ſpread out the lime in near about the ſame quantity that is required in liming ground, or rather more; upon which they lay the ſeed in the uſual manner, and, after cutting the turf in the furrow, lay it on the verge of the bed with the heathy ſide undermoſt, and cover them over with the mould out of the furrow in the common method.

After coming up, they weed, or give them a ſlight covering to keep down the weeds.

When they raiſe them, it takes a little more labour; yet while they are digging a crop of very fine dry potatoes, they are gaining a piece of ground, which was before uſeleſs, and making it fit for ploughing and bearing corn the year following.

Lime is found alſo to be of excellent ſervice to potatoes in cold ſour land, which they manage after the ſame manner, and reap potatoes greatly excelling thoſe without lime, on the ſame ground.

Lime is certainly a very fine manure for potatoos: they uſe it in the iſle above-mentioned without any other thing, on all ſorts of land, even upon a light, rich, lime-ſtone ſoil; and it betters the quality of the potatoe ſurprizingly: beſides fermenting and meliorating the ſoil, it has the property of attracting and abſorbing any cold ſour matter which may be prejudicial to vegetation.

About Caſtletown, in the ſame iſle, they take a great deal of care in their culture of potatoes, and their product pays them very well for their trouble.

After marking out the bed with their ſpade, and ſpreading on the dung, or lime, they begin at one end, and dig acroſs the bed, making it a ſpadeful, all along, higher than the neighbouring ground.

Then they dig and caſt the mould out of the furrows upon the bed, in the common method; and after finiſhing it, they, with a kind of dibble, or ſhaft of a ſpade ſhod with iron, ſome round and ſharp, others ſquare, about three or four inches broad, plant in the ſeed, about ſix or more inches diſtance from one another; and when they come up above ground, they weed them as clean as a garden, and after they are ſtronger and higher, with a hoe earth up the mould about the ſtalks; by which they kill the weeds and have exceeding fine potates.

This excellent root is very valuable on ſeveral accounts.

1. It is eſteemed, and now very generally uſed at the tables of perſons of all ranks; and ineſtimable for the poor, being a cheap and very wholeſome food.

2. It is good for ſeveral ſorts of cattle, particularly for hogs, either for food or fattening them.

3. It is one of the greateſt improvers of land, whether new broke up, or preparatory to any other crop; and is in itſelf very valuable for the crop it produces. It is ſo likewiſe from another circumſtance, viz. That it refuſes no kind of ſoil, if not very wet, but will grow to conſiderable profit on drained bogs, heaths, or waſte lands; and is of very eaſy culture.

Potatoes are ſo generally cultivated in Ireland, particularly in the province of Munſter, that they are the principal, and almoſt the only food of the poor there, for almoſt eight months in the year. They do not eſteem the roots for being very large, which they cannot be in their manner of planting; for they cut the roots into as many pieces commonly, as the potatoe has eyes or buds; one bud to each piece, and ſet them in the ground ſingly with a dibble, about eight or nine inches diſtant every way. Sometimes they cut them in ſlices, not ſo thick as a crown-piece, with an eye to each ſlice; and, in general, are not ſollicitous to leave much of the potato to each eye; which, with cloſe planting, renders the potatoes commonly ſmall, and but few large ones among them.

The following accurate Experiments upon Potatoes, were made by Mr. Wynn Baker, in the Year 1771.

"Notwithſtanding, ſays he, potatoes are the principal food of the labouring people in the country, in this kingdom, and that every one cultivates them, more or leſs, and have done ſo for more than half a century; yet, extraordinary as it may ſeem, I find them quite incapable of anſwering a great number of queſtions, truly important, to the advantageous culture, and judicious choice of this uſeful vegetable.

This circumſtance, added to that of frequently obtaining poor crops myſelf, led me to try the following experiments, which I committed to the ground with the moſt ſcrupulous and minute exactneſs, that human means were capable of; and myſelf attended every ſtage of the buſineſs in planting.

I lay this little ſet of experiments before the public, by way of table, in order to have it in one view. Any one who conſults it, perhaps will be directed in their choice of potatoes, as well as in other points in diſpute. To avoid all danger of inequality in the ground, I choſe a bit where I had twice taken away the ſtaple, ſo that they were planted in an under ſtratum of poor yellow earth.

Minute Experiments on the following Kinds of Potatoes, put down April 27th and 29th, 1771. The Rows 20 Inches aſunder, and each Potatoe ſet 12 Inches apart in the Rows, and 30 Sets in each Row.

N°									Total.
				N°	lb.	oz.		N°	lb. oz.	lb. oz.
1 Spaniſh	Over Dung, chiefly Neat's Dung.		Merchantable	91	12	4	Small	98	3 6	15 10
2 Red French			Ditto	63	13	8	Ditto	51	2 4	15 12
3 Common Wiſe			Ditto	103	16	2	Ditto	86	5 4	21 6
4 Crones			Ditto	53	12	4	Ditto	60	4 2	16 6
5 Munſter White			Ditto	62	12	8	Ditto	59	3 8	16 0
6 Apple			Ditto	50	15	8	Ditto	53	4 10	20 2
		Total	Ditto		82	2	Ditto		23 2	105 4
7 Spaniſh	Under Dung, chiefly Neat's.		Merchantable	54	7	12	Small	60	3 8	11 4
8 Red French			Ditto	40	9	0	Ditto	60	1 12	10 12
9 Common Wiſe			Ditto	89	15	2	Ditto	84	4 8	19 10
10 Crones			Ditto	56	9	12	Ditto	44	2 1	11 13
11 Munſter White			Ditto	54	9	14	Ditto	53	3 8	13 6
12 Apple			Ditto	58	14	14	Ditto	40	2 8	17 6
		Total	Ditto		66	6	Ditto		17 13	84 3
13 Spaniſh	Very ſmall ſingle Eyes or Sets Under Dung, chiefly Neat's.		Merchantable	47	5	12	Small	40	2 8	8 4
14 Red French			Ditto	18	4	8	Ditto	45	2 1	6 9
15 Common Wiſe			Ditto	74	13	8	Ditto	49	2 12	16 4
16 Crones			Ditto	48	9	0	Ditto	50	2 8	11 8
17 Munſter White			Ditto	40	6	8	Ditto	27	1 7	7 15
18 Apple			Ditto	40	11	0	Ditto	36	3 4	14 4
		Total	Ditto		50	4	Ditto		14 8	64 12
19 Spaniſh	Large Seed, Under Dung, chiefly Neat's.		Merchantable	74	8	12	Small	27	1 4	10 0
20 Red French			Ditto	40	9	4	Ditto	33	1 12	11 0
21 Common Wiſe			Ditto	131	18	2	Ditto	60	4 2	22 4
22 Crones *			Ditto	42	7	0	Ditto	27	1 8	8 8
23 Munſter White			Ditto	62	8	12	Ditto	31	2 0	10 12
24 Apple			Ditto	60	12	8	Ditto	32	2 4	14 12
		Total	Ditto		64	6	Ditto		12 14	77 4
25 Engliſh White	Under Dung.		Merchantable	71	13	0	Small	2	3 4	16 4
26 White French			Ditto	45	13	4	Ditto	6	2 8	15 12

* "Here in N° 22, Crones, we have a conſiderable breach in the uniformity of our table, in which nature all the way appears to have been very regular. I cannot account for this difference, other than to ſay, that we have a ſtrong ſuſpicion, that whilſt the man I depended upon came home with the preceding parcel to weigh them, that the fellow he left to dig the next number, took ſome of N° 22 for roaſters; if he did, he ought to be hanged; becauſe it was doubly villainous to overſet ſuch an enquiry. I immediately took him to taſk about it, but he ſtood it out, although I offered him five guineas, only to let me weigh the potatoes, and I would forgive him; however, he ſhall never approach a minute experiment of mine again.

"Whoever

"Whoever ſhall caſt an attentive eye over the preceding table, will ſee, that ſeveral circumſtances of information are immediately pointed at; there are very many others which are omitted; thoſe before us appear to be ſo ſatisfactory, in the ſeveral variations, which ariſe upon the face of the table, that I ſhall, at convenient time, purſue all the changes, which the ſubject before us will admit of. In the mean time let us proceed upon the preſent information.

The firſt queſtion before us is this, Whether planting potatoes under or over the dung, is moſt advantageous to the crop?—This queſtion appears to be concluſively anſwered, by every ſpecies of potato, in the firſt and ſecond ſet; and the totals of each clearly determines in favour of putting the ſeed over the dung.

	lb.	oz.
N° 1 to N° 6, over dung, groſs produce	105	4
7 to 12, under dung, ditto	84	3
Over dung ſuperior to under by	21	1

This difference of 21 pounds, upon ſo ſmall a quantity of ground, would be a very great object upon an acre. Happily in this kingdom, the potatoes are chiefly laid over the dung. In England, they practiſe the contrary in many places.

"Our ſecond object in this enquiry was, to determine by fair experiment, whether the ſmall ſeed is equally prolific (as thouſands aſſert it to be) with that which is reaſonably large. For this purpoſe, I cut ſingle eyes with my own hands, and was careful not to cut them thin, but like pellets. This ſet was planted under dung; and therefore we muſt compare it with our ſecond ſets of experiments.

	lb.	oz.
N° 7 to N° 12, under dung, groſs produce	84	3
13 to 18, under dung, groſs produce	64	12
Reaſonably large ſeed, preferable to very ſmall, by	19	7

This upon an acre would be a prodigious difference: and I think ſeems deciſive in favour of ſeed moderately large. Whereas N° 19 to 24, both incluſive, ſeems by no means to prove very large ſeed to be neceſſary: for if we compare thoſe numbers, with N° 7 to 12, both incluſive, we ſee the greater produce from the larger ſeed is by no means regular, and therefore that point is not deciſive in the preſent enquiry; and the remark upon N° 22 ſhould not be forgotten.

Our third object in this enquiry, is a truly important one to the poor labourer of Ireland, viz. To aſcertain with accuracy, which kind is moſt prolific upon poor broken ground. As N° 25 and 26, did not come to hand time enough to introduce them in the whole ſet of experiments, I muſt throw this part of our enquiry into two diviſions, as there is ſo material a difference between planting over and under dung. To do this in the ſhorteſt manner, I ſhall only throw the ſeveral kinds into two little tables, according to their merit in quantity; the quality is a conſideration chiefly at the gentleman's table.

N°			N°	lb.	oz.		lb.	oz.	Total. lb.	oz.
3	Common Wiſe	Over Dung. Merchantable	103	16	2	Small	5	4	21	6
6	Apple	Ditto	50	15	8	Ditto	4	10	20	2
2	Red French	Ditto	93	13	8	Ditto	2	4	15	12
5	Munſter White	Ditto	62	12	8	Ditto	3	8	16	0
4	Crones	Ditto	53	12	4	Ditto	4	2	16	6
1	Spaniſh	Ditto	91	12	4	Ditto	3	6	15	10

N°			N°	lb.	oz.		lb.	oz.	Total. lb.	oz.
9	Common Wiſe	Under Dung. Merchantable	89	15	2	Small	4	8	19	10
12	Apple	Ditto	58	14	14	Ditto	2	8	17	6
26	White French	Ditto	45	13	4	Ditto	2	8	15	12
25	Engliſh White	Ditto	71	13	0	Ditto	3	4	16	4
11	Munſter White	Ditto	54	9	14	Ditto	3	8	13	6
10	Crones	Ditto	48	9	12	Ditto	2	1	11	13
8	Red French	Ditto	40	9	0	Ditto	1	12	10	12
7	Spaniſh	Ditto	54	7	12	Ditto	3	8	11	4

"Here we alſo have the order of merit in point of quantity of the merchantable potatoes, from equal culture. Our totals vary a little as in the preceding table. The wiſe and apple potatoes keep their place in both tables, as to produce; but the red French and Munſter white, and crones, contend pretty cloſely as to produce; and in the ſecond table vary in their places of merit. Hence we may conclude, that ſome of theſe kinds agree better by being put under the dung than others; but every examination of the latter point, clearly proves, that under dung leſſens the crop. The Spaniſh potatoes, which are certainly the beſt in the world for eating, uniformly keep their place, of being laſt in point of produce.

There is another very material point, worthy of the cultivator's attention, in his choice of his potatoes in theſe tables. He will obſerve, doubtleſs, that I have given the number of merchantable potatoes of each kind; he will therefore ſee that there is a prodigious difference in their ſizes, a circumſtance that comes ſtrong againſt the wiſe potatoes. However for the reader's inſpection, I ſhall attempt a little table upon that point, framed from the preceding ones, according to the order in point of ſize.

A TABLE of SIZES.

N°	N°		lb.	oz.			
6	Apple	50	Weight	15	8	Average Weight per Potato	5 Ounces
26	French White	45	Ditto	13	4	Ditto	$4\frac{3}{4}$
4	Crones	53	Ditto	12	4	Ditto	$3\frac{3}{4}$
2	Red French	63	Ditto	13	8	Ditto	$3\frac{3}{8}$
5	Munſter White	62	Ditto	12	8	Ditto	$3\frac{1}{4}$
25	Engliſh White	71	Ditto	13	0	Ditto	$2\frac{7}{8}$
3	Common Wife	103	Ditto	16	2	Ditto	$2\frac{1}{2}$
1	Spaniſh	94	Ditto	12	4	Ditto	$2\frac{1}{8}$

The following table of the poor man's potatoe, diſtinguiſhes the quantity, and the gentleman's the quality, according to the foregoing experiments.

The Poor Man's Potato.		The Gentleman's Potato.	
Firſt.	Common Wife.	Firſt.	Spaniſh.
Second.	Apple.	Second.	Engliſh White.
Third.	Red French.	Third.	Munſter White.
Fourth.	Crones.	Fourth.	White French.

Mr. Baker finding it very expenſive to pick and ſort his potatoes for planting in the common way, got a large riddle made of very ſtrong iron wire, the meſhes whereof were $1\frac{3}{4}$ inch. "I ſet to work with this, ſays he, a man and boy, and I am ſure they will do more in a day than forty pickers. The riddle coſt me five ſhillings and fivepence, and I am perſuaded has ſaved me twenty pounds ſince I had it: but I find I muſt have a ſet of them, of different ſizes."

Land well reduced by tillage, will produce good crops of potatoes without manure, provided they are hoed with the hand hoe; and ſtill better by horſe hoeing. But poor or ordinary land ſhould be well manured; and upon ſuch land they are commonly manured highly, both for the benefit of the potatoe crop, and for the crop that ſucceeds; the manure and tillage given to the potatoes, by ploughing the land for them, hoeing and digging them up, together with the cover of their ſucculent leaves, while growing, prepare the land admirably for another crop. But tho' a plentiful manuring for the potato crop is of great ſervice, it may be over done, and then the potatoes will be wet, and not fit for the table, but muſt be given to the hogs.

When land is well tilled for potatoes, and the ſurface made fine, a ſudden daſh of rain, and dry weather afterwards, will ſometimes bind the ſurface, and form ſo hard a cruſt upon it, that the broad ſucculent leaves of the potatoes cannot riſe and get through it. In that caſe, the ſurface ſhould be harrowed to break the cruſt, taking care that the tines do not go ſo deep as to wound the tops of the plants; and if proper care is taken in this reſpect, it is beſt to harrow or hoe, and looſen the ſurface of every crop of potatoes, when the plants are advancing towards the ſurface of the land.

There is a new ſpecies of potatoe lately introduced into England, by ſome called the Bedford potato, which reſembles a congeries, or cluſter of roots of potatoes grown together. This potato has a ſurpriſing force of vegetation beyond any common potato, but is not ſo pleaſant taſted, and therefore not fit for the table. However the produce of it is ſo great, that it merits the attention of farmers, who keep many hogs, or ſuch cattle as will eat potatoes. Some of theſe potatoes have weighed nine or ten pounds; and one ſmall cutting has produced thirty pounds of potatoes, in about four ſquare feet of ground.

PREGNANT, teeming, breeding, fruitful.

PRICKING, a term uſed by farriers, &c. to ſignify the driving a nail into the ſoft part of a horſe's foot.

If a lameneſs proceeds from pricking in ſhoeing, the foot ſhould be pared thin on the wounded ſide; and after dreſſing with tar and turpentine, let it be ſtopped with two ounces of common turpentine, melted down with four of lard.

If the nail penetrates to the joint of the foot, where matter may be formed, and by its long continuance putrify, ſo as to erode the cartilages of the joint, the caſe is incurable.

If the nail has paſſed up to the nut-bone, it is incurable, becauſe this little bone cannot exfoliate; and becauſe the cartilaginous part of it is deſtroyed, as ſoon as injured.

If the nail has not paſſed to the tendon, the horſe will do well, without a neceſſity for drawing the ſole; but if the tendon is wounded, the ſole muſt be carefully drawn, becauſe a ſinovia and gleet is diſcharged.

When gravel is the cauſe, it for the moſt part follows the nail-holes, and if it gets to the quick, cannot return, unleſs it is ſcraped out; for the make of the hoof, which is ſpiral like an ear of corn, favours its aſcent, ſo that the gravel continues working upwards towards the coronet, and forms, what the farriers call a quittor bone.

The nature of this diſorder points out the method of cure, which is to be as expeditious and careful as poſſible, in getting out the gravel: if it is found difficult to effect this, let the ſole or hoof be pared thin, and if neceſſary, the wound inlarged to the bottom, and then dreſſed up as uſual. Should the coffin-bone be affected, remember, always to bathe the hoof with vinegar, or repellers, in order to allay the heat and inflammation, which often happen on ſuch occaſions; and ſhould the pain and anguiſh affect the legs, treat them in the ſame manner, or charge the leg and paſtern with a mixture of wine lees and vinegar.

PRONG, an implement much uſed in huſbandry, conſiſting of two or three pieces of iron, inſerted into a handle, for taking up corn, ſtraw, dung, &c.

PRONG-*hoe*, a term uſed to expreſs an inſtrument uſed to hoe or break the ground near, and among the roots of plants.

The ordinary contrivance of the hoe in England is very bad, it being only made for ſcraping on the ſurface; but

but the great uſe of hoeing being to break and open the ground, beſides the killing the weeds, which the ancients, and many among us, have thought the only uſe of the hoe, this dull and blunt inſtrument is by no means calculated for the purpoſes it is to ſerve.

The prong-hoe conſiſts of two hooked points of ſix or ſeven inches long, and, when ſtruck into the ground, will ſtir and remove it the ſame depth as the plough does, and thus anſwer both the ends of cutting up the weeds and opening the land. The ancient Romans had an inſtrument of this kind, which they called the bidens; but they were afraid of its uſe in their fields and gardens, and only uſed it in their vineyards. The prong-hoe comes into excellent uſe, even in the horſe-hoeing huſbandry; in this the hoe-plough can only come within three or four inches of the rows of corn, turneps, and the like; but this inſtrument may be uſed afterwards, and with it the land may be raiſed and ſtirred, even to the very ſtalk of the plant. *Tull's Huſbandry.*

PROPAGATION, the continuance or diffuſion of ſucceſſive production.

The ingenious Mr. Barns has given us the following method of propagating trees by the bud and branch.

"Every leaf, ſays he, upon the branch of a tree, or ſhrub, has uſually a young bud in its boſom; and it is certain each of theſe buds has in it the rudiment of a tree of the ſame kind: therefore it appeared reaſonable to think that every branch might afford as many new plants as there were leaves upon it; provided it were cut into ſo many pieces, and a proper dreſſing was found to prevent the raw ends of each piece from decay. The beſt mixture for this purpoſe, upon careful and repeated experience, I have found to be this.

"Melt together, in a large earthen veſſel, two pounds and a half of common pitch, and half a pound of turpentine. When they are melted, put in three quarters of an ounce of powder of aloes; ſtir them all together; and then ſet them on fire: when it has flamed a moment, cover it up cloſe, and it will go out: then melt it well, and fire it again in the ſame manner: this muſt be done three times. It muſt be in the open air, for it would fire a houſe; and there muſt be a cover for the veſſel ready. After it has burnt the laſt time, melt it again, and put in three ounces of yellow wax ſhred very thin, and ſix drachms of maſtich in powder. Let it all melt together till it is perfectly well mixed; then ſtrain it through a coarſe cloth in a pan, and ſet it by to cool.

"When this is to be uſed, a piece of it muſt be broke off, and ſet over a very gentle fire; it muſt ſtand till it is juſt ſoft enough to ſpread upon the part of the cutting where it is wanted; but it muſt not be very hot. It is the quality of this dreſſing, to keep out wet entirely: the part which is covered with it will never decay while there is any principle of life in the reſt; and, this being ſecured, nature will do the buſineſs of the growing.

"This I have found true in practice; and by repeated trials, in more kinds than one, I have found that I could raiſe from any piece of a branch as many good plants as there were leaves upon it.

PRUNIFEROUS *trees*, thoſe which bear a pretty large and fleſhy fruit, with a nucleus in the middle.

PUCKBALL, a ſpecies of muſhroom, full of duſt.

PUDDOCK, or PURROCK, a ſmall incloſure.

PULSE, a term applied to all leguminous plants, as tares, peaſe, &c.

All the ſpecies of pulſe afford great abundance of excellent manure, in the ſtate in which nature preſents them. The cuſtom of ploughing in green ſucculent plants, is very ancient. All the Roman writers commend it highly, and with much reaſon. Collumella recommends particularly lupins, as a manure, which, if cut down and turned in while green, will have as good effect as the beſt and ſtrongeſt dunging whatever. They may be ſown upon poor land about the middle of September, and will enrich it greatly if ploughed in before they attain their full growth. In gravelly ſoils they ſhould be cut down after they have put forth their ſecond flower; and in ſtrong lands, after the third. In the former of theſe grounds they are turned in while young and tender, that they may quickly rot; and in the latter, they are let ſtand till they grow ſtronger, that they may bear up the more ſolid and ſtiff clods of earth, and keep them the longer ſuſpended; by which means the air has freer acceſs to the ſoil, and theſe clods, being heated and dried by the ſummer ſun, are the more eaſily opened, and reſolved into duſt. Thus ſays this judicious author, juſtly remarkable for his ſuperior ſkill in huſbandry. But Mr. Miller is of a contrary opinion.

The *Maiſon Ruſtique*, a work of very high repute, as is evident from the great number of editions it has gone through, ſtrongly and rightly recommends peaſe, beans, lupins, vetches and other ſucculent plants, as excellent manures, eſpecially for ſandy ground. Theſe plants enrich the earth greatly if ploughed in, either green, or when in bloom. In ſtrong land they ſhould not be turned down till the pods begin to harden.

In Piedmont and other places where they fatten their land with this manure, lupins are ſown upon the fallow ground towards the end of June, immediately after the ſecond ploughing, ſo that they are ſtill green when the third ploughing is given and the corn is ſown. Experience ſhews the huſbandmen in thoſe countries, that this method of uſing theſe plants for manure makes them ample amends for the loſs of the pulſe or fodder they might otherwiſe reap from them: but thoſe who do not like to loſe any thing, plough in the huſks after they have taken out the grain.

Dr. Liſter likewiſe recommends for the improvement of ſandy, light ground, or any clay well ſanded, all plants of the pulſe or pea kind, and particularly, "upon experience, the wood vetch, which, beſides its being perennial (at leaſt with reſpect to its roots) and its thriving even in woods and among buſhes in almoſt every country, has theſe farther qualifications, that it ſhoots out a thouſand roots far and wide, and ſpreads itſelf under ground, like quick-graſs; whilſt it is ſo rampant above ground, that it will climb a fathom and a half upon meaſure, and preſerve itſelf in ſpite of weeds or drought. It may be ſet, as well as ſown, in furrows. For the former of theſe purpoſes the roots may be dug up in September, which is alſo the time for gathering the ripe ſeed. The growth of the plants will be greatly advanced by ſetting their roots; for the older they are, the ſtronger, more numerous, and fuller of buds their ſhoots will be. I ſowed in the latter end of March the ſeed which I had gathered in September, and had that year a very great increaſe, the bed being thick covered over with graſs above two feet high: but it did not flower that year. I reckoned that one pea had put forth above thirty ſhoots in Auguſt of the firſt year. In the ſecond year, it flowered by the middle of June, and bore a wonderfull crop, the roots being innumerable,

I have

I have obſerved this pea very common in all the mountains as well as plains of England, where buſhes or hedges are. Both the pea and graſs are very ſweet, and very agreeable to cattle, as I have tried."

Buck wheat and vetches are the two plants moſt commonly ſown in England for manure. The beſt time for ploughing them in, is when they are in bloom; being then in their moſt ſucculent ſtate. Some farmers turn down their ſecond crop of clover, to enrich the land for wheat in the autumn. This ſhould be done early enough to give the plants ſufficient time to putrefy thoroughly before the grain is ſowed: otherwiſe, it might prove prejudicial, by bringing on a heat which would hurt the corn.

The Reverend and ingenious Mr. Elliot, of New England, prefers millet to every other plant for green dreſſing of land, on account of the cheapneſs of the ſeed, and the largeneſs of the ſtalks and leaves, which muſt afford a good coat to turn in when ploughed. An old farmer who had long been in the practice of green dreſſing, aſſured this gentleman that he had encreaſed the ſtrength of his land to a great degree, in a few years, by the following method. After his oats were harveſted, he added a little ſeed to the ſcattered grains, and then ploughed them in. Towards the end of September, he ploughed in the green oats, and ſowed rye; and the next ſummer, when the rye was well grown and full of ſap, he ploughed that in at the uſual ſowing ſeaſon, then ſowed wheat, and always had a large crop.

PURGING, the operation of evacuating the impurities of an animal body by ſtool.

Purging is often neceſſary in groſs full horſes, in ſome diſorders of the ſtomach, liver, &c. but ſhould be directed with caution. Before a purge is given to any horſe, it is neceſſary ſome preparation ſhould be made for it, in order to render the operation more ſafe and efficacious: thus a horſe that is full of fleſh ſhould firſt be bled, and at the ſame time have his diet lowered for a week, eſpecially thoſe that have been pampered for ſale; ſeveral maſhes of ſcalded bran ſhould alſo previouſly be given, in order to open the bowels, and unload them of any indurated excrement; which ſometimes proves an obſtacle to the working of the phyſic, by creating great ſickneſs and griping.

Let it be remembered, that a horſe is purged with difficulty; that the phyſic generally lies twenty-four hours in the guts before it works; and that the tract of bowels it has to paſs through, is above thirty yards; and lying horizontally, conſequently reſinous and other improper drugs may, and often do, by their violent irritations, occaſion exceſſive gripings and cold ſweats, ſhave off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications and death.

It is remarkable too, that the ſtomach and guts of a horſe are but thin, compared to ſome other animals of the ſame bulk, and therefore muſt be more liable to inflammation and irritation.

Horſes kept much in the ſtable, who have not the proper benefit of air and exerciſe, in proportion to their food, ſhould in ſpring have a mild purge or two, after a previous preparation by bleeding, lowering their diet, and ſcalded maſhes.

Horſes that fall off their ſtomach, whether it proceeds from too full feeding, or ingendering crudities and indigeſted matter, ſhould have a mild purge or two.

Horſes of a hot temperament, will not bear the common aloetic purges; their phyſic therefore ſhould be mild and cooling.

Purging is always found very beneficial in ſtubborn dry coughs; but mild mercurials joined with them, make them yet more efficacious.

Horſes that have thoſe ſorts of lameneſſes, that are ſaid to proceed from humours flying about (which are of the rheumatic kind, and in young horſes proceed from fizy blood, and occaſion lameneſs in every limb) require frequent purging; and ſhould alſo have between whiles, medicines that attenuate and thin the fluids.

Horſes of a watry conſtitution, who are ſubject to ſwelled legs, that run a ſharp briny ichor, cannot have the cauſes removed any ways ſo effectually as by purging.

The firſt purge you give to a horſe ſhould be mild, in order to know his conſtitution.

It is a miſtaken notion, that if a proper prepared purge does not work to expectation, the horſe will be injured by it; for though it does not paſs by ſtool, its operation may be more efficacious, as an alterative to purify the blood, and it may paſs by urine, or other ſecretions.

Purging medicines are very ſucceſsfully given in ſmall quantities, mixed with others; and act then as alteratives.

If mercurial phyſic is given, care ſhould be taken that it be well prepared; and warmer cloathing, and greater circumſpection is then required.

Purges ſhould be given early in the morning upon an empty ſtomach; about three or four hours after the horſe has taken it, he ſhould have a feed of ſcalded bran; and a lock or two of hay may then be put in his rack. The ſame day give him two more maſhes; but ſhould he refuſe warm meat, he may be allowed raw bran.

All his water ſhould be milk warm, and have a handful of bran ſqueezed in it; but if he refuſes to drink white water, give it him without bran.

Early the next morning, give him another maſh; but if he refuſes to eat it, give him as much warm water as he will drink: let him be properly cloathed, and rode gently about. This ſhould be done two or three times a day, unleſs he purges violently, once or twice will then be ſufficient: at night give him a feed of oats mixed with bran.

During the working, a horſe ſhould drink plentifully; but, if he will not drink warm water, he muſt be indulged with cold, rather than not drink at all.

We ſhall here inſert ſome general forms of purges.

Take ſuccotrine aloes ten drams, jallap and ſalt of tartar each two drams, grated ginger one dram, oil of cloves thirty drops; and make them into a ball with ſyrup of buckthorn.

Or,

Take aloes and cream of tartar each one ounce, jallap two drams, cloves powdered one dram, ſyrup of buckthorn a ſufficient quantity.

Or,

Or,

The following, which has an eſtabliſhed character among ſportſmen.

Take aloes, from ten drams to an ounce and a half, myrrh and ginger powdered each half an ounce, ſaffron and oil of anniſeed each half a dram.

Mr. Gibſon recommends the following.

Take ſuccotrine aloes ten drams, myrrh finely powdered half an ounce, ſaffron and freſh jallap in powder, of each a dram, make them into a ſtiff ball with ſyrup of roſes, then add a ſmall ſpoonful of rectified oil of amber.

The ſuccotrine aloes ſhould always be preferred to the Barbadoes, or plantation aloes, though the latter may be given to robuſt ſtrong horſes, but even then ſhould always be prepared with the ſalt, or cream of tartar; which by opening its parts, prevents its adheſion to the coats of the ſtomach and bowels; from whence horrid gripings, and even death itſelf has often enſued. This caution is well worth remarking, as many a horſe hath fell a ſacrifice to the neglect of it.

Half an ounce of Caſtile ſoap, to a horſe of a groſs conſtitution, may be added to any of the above; and the proportions may be increaſed for ſtrong horſes.

When mercurial phyſic is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate horſes; and if prepared with the Indian rhubarb, will not be expenſive.

Take of the fineſt ſuccotrine aloes one ounce, rhubarb powdered half an ounce or ſix drams, ginger grated one dram; make into a ball, with ſyrup of roſes.

The following purging drink may be given with the utmoſt ſafety; it may be quickened, or made ſtronger, by adding an ounce more ſenna, or two drams of jallap.

Take ſenna two ounces, infuſe it in a pint of boiling water two hours, with three drams of ſalt of tartar; pour off, and diſſolve in it four ounces of Glauber ſalts, and two or three of cream of tartar.

This laſt phyſic is cooling, eaſy, and quick in its operation; and greatly preferable in all inflammatory caſes to any other purge, as it paſſes into the blood, and operates alſo by urine.

When horſes loſe their appetites after purging, it is neceſſary to give them a warm ſtomach drink, made of an infuſion of chamomile flowers, aniſeeds and ſaffron: or the cordial ball may be given for that purpoſe.

Should the purging continue too long, give an ounce of diaſcordium in a pint of Port wine, and repeat it once in twelve hours, if the purging continues. Plenty of gum arabic water ſhould alſo be given, and in caſe of violent gripes, fat broth glyſters, or tripe liquor, ſhould be often thrown up, with an hundred drops of laudanum in each.

The arabic ſolution may be thus prepared.

Take of gum arabic and tragacanth of each four ounces, juniper berries and carraway ſeeds of each an ounce, cloves bruiſed half an ounce; ſimmer gently in a gallon of water, till the gums are diſſolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it often in a horn.

When a purge does not work, but makes the horſe ſwell, and refuſe his food and water, which is ſometimes the effect of bad drugs, or catching cold, warm diuretics are the only remedy; of which the following are recommended.

Take a pint of white wine, nitre one ounce, mix with it a dram of camphor diſſolved in a little rectified ſpirit of wine; then add two drams of oil of juniper, and the ſame quantity of unrectified oil of amber, and four ounces of honey, or ſyrup of marſhmallows.

Or,

Take Venice turpentine one ounce, incorporate with the yolk of an egg; nitre one ounce, then add juniper berries, and freſh aniſeeds pounded, each half an ounce, unrectified oil of amber two drams; make into a ball with ſyrup of marſhmallows.

Q.

QUEEN-BEE, a name given by late writers to what uſed to be called the king-bee, or king of the bees; a large and long-bodied bee, of which kind there is only one found in every ſwarm, and which is always treated with the greateſt reſpect by the reſt. *See the article* BEE.

This is, indeed, the parent of the ſwarm, and from the fœcundity of this one female, a whole hive is eaſily and ſoon repeopled.

It is to be obſerved, that the autumn and winter ſeaſons deſtroy a great number of the bees; ſo that a hive, which was full in the ſummer, is often found ſo thinly peopled before the end of winter, that the bees ſeem only a few inhabitants in a very large city: by Midſummer again this ſame hive ſhall, however, be found ſo well filled with inhabitants, that there ſhall be a neceſſity of ſending out a colony in the name of a new ſwarm, and yet the hive will remain as full as it can well hold. This increaſe might well appear very amazing, if all the remaining bees of the hive were ſuppoſed to be females, and to join in it but how much more ſo when it muſt be acknowledged, that it is all owing to one female, and that this queen-bee, or mother-bee, alone, has given origin to ſuch an immenſe progeny?

The form of this bee, and there being only one ſuch in a hive, naturally led all who ſaw it into an opinion of ſomething ſingular in its nature, and the antients determined that it muſt be the king over the reſt: they made it an abſolute monarch, and have ſuppoſed that all the buſineſs of the hive was done by its immediate orders; and that the ſeveral parties of bees allotted to work in the making of the combs, in the filling their cells, in the ſtopping the crevices of the hives, and in carrying away the filth, &c. had all their ſeveral ſtations allotted them by this wiſe and provident monarch. This was giving great talents to the monarch bee; but this was mere fancy, and it is plain, that if this creature rules, it is over a people who all perfectly well know their ſeveral buſineſſes: but it rather appears, that there is no ſovereignity at all, but that this creature is reſpected in a very high degree by the reſt, as the common parent of the whole nation.

There were not wanting among the antients, however, ſome who believed this large bee to be a female, and theſe pretend that ſhe brought forth only females like herſelf, which ſucceeded her in her reign. They had a very different opinion as to the origin of the common bees, not ſuppoſing them generated of animal parents like themſelves, but produced out of corruption, and born of the fleſh of a bull or cow. Among the later writers this opinion, notwithſtanding the ſanction of the poet Virgil, has been laughed out of the world; yet it was long before the true origin of bees, even after this, was known. The author of the Female Monarchy, though well apprized of this great bee being of the female ſex, yet ſuppoſed that ſhe only produced young ones like herſelf; and pretended that the common bees copulated together for the production of other bees like themſelves: this, however, has been ſince found to be wholly erroneous, the female, or queen-bee, giving birth to all, and theſe common bees being of no ſex at all. Many of the authors who have not given into the idle opinion of the bees being bred of putrid fleſh, have yet given them an origin not leſs idle and ridiculous. They pretend that the bees are exempted from the pain of producing either eggs or young; and that the offspring are formed of the juices of flowers, the different kinds, as the drones, females, &c. owing their riſe to juices of different kinds. Theſe, and a number of other falſe notions, have been propagated in regard to bees; but their true origin could not well be found till we were in a condition to ſee what paſſes at certain times within the receſſes of the hive, which is done by the uſe of that excellent invention, the glaſs hive. By this, and by the help of diſſections, we may eaſily inform ourſelves perfectly of the true ſtate of the caſe. The parts of generation are the ſubjects of our enquiry for this purpoſe, and, though the bodies of theſe animals are ſo ſmall, theſe are uſually ſufficiently large to be diſtinguiſhed, often taking up more room in the abdomen than all the other parts together. Thus, if the large long-bodied bee be opened, the abdomen will be found to contain vaſt numbers of oblong bodies, which any one acquainted with inſects will eaſily diſtinguiſh to be eggs: vaſt numbers of theſe are large enough to be obſervable by the naked eye, but, when the aſſiſtance of glaſſes is called in, there are diſcerned a vaſt number of other ſmall eggs, which exceed all computation. It is eaſy to determine from this, that this creature, ſo long eſteemed a male, is in reality, a female, and is in condition to give birth to a very numerous poſterity.

In order to diſtinguiſh this, however, a proper time muſt be choſen for the diſſection, and the moſt proper of all is when the creature is juſt ready to depoſit her eggs. This is in the months of April and May, and the moſt certain time of all is when ſhe is in a hive where a new ſwarm have been received about ten days before: if ſhe be diſſected at other times, the eggs are leſs viſible; and, particularly

ticularly in winter, there requires a good glaſs to ſhew the rudiments of them. This is a diſagreeable experiment, indeed, becauſe it is always the deſtruction of a future ſwarm; all the eggs we ſee in the diſſected female being what would have produced bees to labour for our benefit.

When the body of one of the drones is opened, there is found, inſtead of theſe vaſt numbers of eggs, a part ſeeming proper for a male organ of generation: and in the abdomen a number of veſſels running in ſeveral windings and contortions, and filled with a milky humour. Theſe ſeem deſtined for the important uſe of impregnating the eggs in the belly of the female, and it is very natural to determine from this that theſe are the males.

The common bees, when diſſected, at whatever time of the year never ſhew the leaſt marks of any ſex at all. The inteſtines of theſe bees are found at times to be more or leſs diſtended with honey, and with rough wax; but there are never diſcovered any eggs, nor any of the winding ſeminal veſſels, ſo that it is plain they have no ſhare in propagating the ſpecies: and the obſervation of the ſwarms from time to time, with the aſſiſtance of glaſs hives, gives proof to what the diſſections ſeem to make ſufficiently certain without this evidence.

The female bee reſides within the centre of the hive, always living in one of the ſpaces between the combs; if ſhe occaſionally comes out to the ſurface, and is ſeen walking over the edge of a comb, ſhe is to be well obſerved at thoſe times; for her only buſineſs is the laying her eggs in ſome of the empty cells of that part of the comb, which done, ſhe always retires again.

In order to ſee the female, or mother bee, employed in this operation, we are to obſerve in the morning hours, between ſeven and ten, what paſſes in a glaſs-hive into which a ſwarm have been received a few days before. The ſpeed with which the common bees labour in making their combs on this occaſion is almoſt incredible, and they ſeem not only to labour to have cells to depoſit their honey in, but to know that the parent bee is at this time loaded with eggs for the production of a numerous progeny, and that ſhe has an immediate neceſſity of cells for the depoſiting them in. This neceſſity is ſo urgent, that ſhe is often forced to depoſit them in cells not yet finiſhed; though the bees labour ſo vigorouſly, that they often will erect a whole large comb in one day. If the hive be narrowly watched at theſe times in the morning hours, the famale bee will be ſoon found employed in her work, and will be ſeen dropping her tail by turns into ſeveral cells every day. If the combs be examined a day or two after this, they will alſo be found to contain the eggs; one of theſe is placed in each cell, and appears in form of an oblong white body, fixed either to the ſolid angle of the baſe, or to one of the angles compoſed by the rhombs which form the triangular baſe of the cell, and is always attached in ſuch a manner, that it lies nearly in an horizontal poſition.

The flat glaſs hives are the moſt favourable for the making theſe obſervations, ſince in thoſe the combs are ſo narrow and ſo numerous, that the whole is taken in view at a time, from one ſide or the other; and there are always ſeveral combs to be made choice of for the operation; in the morning hours of April and May, the female mother-bee will be uſually ſeen walking very ſoberly over one or other of theſe combs, attended by a guard of about twenty of theſe common bees, all placing themſelves in ſuch a manner, that their faces are turned towards her, and all paying her the greateſt marks of homage and adoration. As ſhe walks along in this ſtate, ſhe examines every cell as ſhe paſſes over, and ſuch as ſhe finds yet empty, and fit for her purpoſe, ſhe reſts at: and, introducing the hinder part of her body at the top, plunges it ſo deep in that her tail touches the bottom. Then ſhe depoſits one egg and no more, and this is at that time covered with a glutinous matter, which faſtens it to the place where it is laid: from this cell the female paſſes to ſeveral others, where ſhe depoſits her eggs in the ſame manner.

Some authors who have written of the polity of bees, have repreſented the time of the female bee's laying her eggs as a ſeaſon of feſtivity and rejoicing in the hive; but this does not at all appear to be the caſe; the few bees which attend her on this occaſion ſeem the only ones that know any thing of the matter, and their behaviour favours more of homage and reſpect than of joy: they are continually ſtroking and bruſhing her clean with their legs and with their trunks, and offer her from their own mouths the fineſt honey, when ſhe has occaſion for food. The reſt are all employed in their proper offices, and the work of the hive goes on as uſual; and, indeed, it is well that it does ſo, for this time of rejoicing would be of very bad conſequence to the affairs of the hive, if carried on as ſuppoſed, ſince the female bee is thus employed, more or leſs, during the whole ſummer months.

When the female bee has laid ſix or ſeven eggs, ſhe always takes a time of reſpite or repoſe; and, during this time, the bees which form her levee are doubly buſy in their careſſes, ſome bruſhing her head and breaſt with their trunk, but ſeveral being always employed together to cleanſe the hinder rings of the body, which have been fouled by being thruſt into the cells. When this is done, ſhe begins again; but Mr. Reaumur obſerves, that he never could ſee a female lay more than ten or twelve eggs at one time: he ſuppoſes that his preſence diſturbed the creature, and finally drove her into the inner parts of the hive, where ſhe might continue her work in cells leſs expoſed. It is not difficult to compute the number of eggs which the female lays every day, from the ſwarm which is ready to leave the hive at the end of May: this ſwarm uſually amounts to at leaſt twelve thouſand, and as the hive out of which theſe depart is not leſs peopled by their loſs, it is evident that they were all the produce of the eggs depoſited by the female in the preceding months of April, with a part of March, and a few of the firſt days of May. On a moderate computation, on theſe principles it will appear, that the female bee cannot lay leſs than two hundred eggs every day, for a long ſpace of time together; and this, though ſeemingly a monſtrous increaſe, is yet much leſs than that of ſome other of the winged inſects, in one of which, a two-winged fly, that author counted no leſs than twenty thouſand living worms, all ready to be depoſited by the parent, and to become flies of the ſame kind.

It has been ſtrongly objected againſt this ſyſtem, that, though the female bee lays eggs, ſhe is not the only one that lays; and many will not give up the opinion of the common bees alſo laying ſome eggs, though but a few in number; obſerving, that, if each of theſe lay only four or five eggs, it would be enough to give birth to a whole ſwarm, without ſuppoſing that this prodigious fœcundity belonged to the female bee alone: but this is running into the old error of the female producing only females like her-

ſelf; whereas, if we obſerve the cells in which we ſee the female depoſit her eggs, we ſhall in the ſequal find the common bees produced from theſe eggs, and iſſuing out of theſe cells: this is a ſufficient proof to any fair reaſoner, ſince it appears very plain, that, if the female produces them, they do not produce one another. It is alſo evident that not only theſe common or working bees, but alſo the drones, or male bees, are produced from the eggs of this ſame female; and there is this remarkable forecaſt in the female, that ſhe always depoſits the eggs which are to give origin to theſe, in peculiar cells, proper for the reception of the worms which are to be hatched from them. It is obſerved, in examining a hive, that there are always ſome combs, or ſome parts at leaſt of combs, the cells of which are much larger than thoſe of the other parts or combs: theſe large cells are deſtined for the reſidence of the larger worms, which are to produce the drones or male bees. It has been obſerved as a miraculous ſingularity by ſome, that the female bee always knows before-hand, whether the egg ſhe is going to lay will produce a male or a common bee; and that, according to this knowledge, ſhe never depoſits the eggs for a male in a ſmaller cell, nor that of a common bee in a large one; but there is, in reality, leſs wonder in this than is ſuppoſed, for the eggs of which the drones are to be hatched are much larger while in the body of the female than thoſe of which the common bees are to be produced, and the whole occaſion of this choice in regard to the placing of them is, that, when the creature finds a large egg coming forth, ſhe ſeeks one of the large cells to depoſit it in; and when the common ſmall eggs are coming, ſhe contents herſelf with the common cells.

It is very natural to believe, that the female bee lays a third kind of eggs; and that, beſides producing many thouſand common, or working bees, and many hundreds of the males or drones, ſhe ought to lay one egg at leaſt capable of producing a female like herſelf, which is to be the mother of a future progeny, and the queen of the preſent race; ſince, without ſuch a one for their leader, the young brood would never leave the hive in the nature of a colony, and ſettle themſelves elſewhere. What we thus perceive ought to be the caſe, is alſo found in reality to be ſo, and the female, beſides the other kinds of eggs, is found by a ſtrict obſervation to lay alſo eggs of this kind. We might perhaps only expect one female bee to be produced for each ſwarm, but, as nature has ſeemed every where prodigal in the manner of the increaſe of her works, ſo it is in this caſe alſo. What millions of ſeeds are produced on a common elm-tree, for one that ſtrikes and ſucceeds ſo well as to grow up to be a tree? And, of the number of young produced from the ſpawn of a carp, how few live to the ſize of a parent? Thus it alſo is in regard to the female bees: nature, though it has allotted only one of this kind, as abſolutely neceſſary to the new ſwarm, yet has given abundance of chances for that one to ſucceed, by the female's uſually laying at leaſt ten eggs for the production of the female offspring, and often not leſs than twenty: there are, indeed, ſome ſeaſons when not one female is produced; but in theſe ſeaſons there is no ſwarm going out from the old hive, the creatures being informed by nature, that they have no buſineſs for combs and cells when they can have no offspring to rear in them.

The working bees are not only very obedient to, and very careful of their queen, or female parent, but they are alſo very ſolicitous about her progeny. This is very evident in the ſtructure of the cells, which they prepare for the reception of thoſe eggs which are to be hatched into females. It has been before obſerved, that they prepare larger cells for the eggs which are to become drones, or male bees, than for thoſe which are to produce workers like themſelves. The large cells deſtined for the drones are, however, of the ſame ſhape and figure with the others, differing only in ſize; but this is not the caſe with thoſe deſtined for the female offspring: theſe are not only very large, but very clumſily contrived, for the ſake of ſtrength; their ſides being much thicker than thoſe of the reſt, and their figure oval. The bees are extremely ſparing of their wax on all other occaſions, but for the conſtruction of theſe royal cells, as they may not improperly be called, they are as remarkably profuſe: one of the royal cells will weigh more than an hundred and fifty of the common kind. The bees are no more ſparing of the room than of the materials in the conſtruction of theſe royal habitations: they are often placed near the center of a comb, and a vaſt number of other cells are deſtroyed for their baſe; often alſo they hang down from the reſt of the comb, in form of ſtalactitæ from the roofs of ſubterraneous caverns.

A cell of this kind, when firſt formed, repreſents an acorn cup; but it is ſoon lengthened beyond the poſſibility of retaining that figure, and it remains thus till the creature is hatched from the chryſalis or nymph ſtate, and comes out of it; after which the bees, to loſe no room in the hive, form other common cells upon it, and the only remaining mark of the female cell, is the appearance of a knot in the place where it once ſtood.

The number of cells deſtined to receive the eggs which are to produce female bees are ſo few, and they are commonly placed in ſuch cloſe parts of the hive, that there is no great probability of ſeeing the female employed in laying her eggs in them: there is no reaſon to doubt the fact, however, ſince, when we know that ſhe lays eggs for the production of the males and the working bees, there is no wonder that ſhe would alſo lay ſome for the production of the females like herſelf.

It might ſeem much harder to conceive how ſo vaſt a number of bees ſhould be produced from this one, as we know are produced from her; but, when one of the females is opened, the vaſt number of eggs diſcovered in each of her ovaries makes the prodigious increaſe no way wonderful.

Swammerdam obſerved, that the number of veſicles in the ovary of the female bee was aſtoniſhingly great; he eaſily counted an hundred and fifty in each ovary, and could count about ſeventeen eggs in each veſicle large enough to be diſtinctly viſible; each ovary contains, therefore, two thouſand five hundred and fifty eggs, and both ovaries five thouſand one hundred. When we find ſo many eggs at once diſtinguiſhable by their ſize, it will be eaſy to conceive, according to the common courſe of nature in the propagation of inſects, that there may be more than as many too ſmall to be yet diſtinguiſhable; and, at that rate, the number of twelve thouſand bees, which is the quantity that compoſes a moderate ſwarm, is not wonderful for the product of the eggs of one female for one ſeaſon. *Reaumur's Hiſt. Inſ.*

QUICK, or *Quickſet-hedge*, a general name for all hedges, of whatever ſorts of plants they are compoſed, to diſtinguiſh them from dead hedges; but in a more con-

fined ſenſe of the word, it is applied to the white or hawthorn, the ſets or young plants of which are raiſed by the nurſery gardeners for ſale. *See the article* FENCE.

QUICKSILVER, a very ponderous fluid mineral, generally called mercury.

In the year 1765, a diſcovery was made (or rather revived, for it is mentioned by Mr. Bradley) that quickſilver was a ſovereign remedy for deſtroying inſects on trees.

The narrative of this diſcovery was contained in a letter written by Dr. R——; to Dr. P——, in which the former begs the aſſiſtance of the latter "in laying before the learned world an account of ſome experiments, that have been tried with ſucceſs, and which, when fully known, will, he believes, be of great ſervice to the vegetable part of the creation, by totally deſtroying thoſe pernicious inſects, that are apt to infect the tender leaves and young ſhoots of our choice fruit-trees: and for which, no remedy, that he had ever heard, or read of, has been as yet propoſed, that is either adequate to the diſeaſe, or effectual to the cure." Dr. R——, therefore, in the following part of the letter, deſires Dr. P—— "to lay before the Society for the Encouragement of Arts, &c. the following experiment, that was tried laſt ſpring, with ſucceſs, by one George Bradford, a clothier in the city of Hereford, and a very ingenious young man: in order after the experiment has been fully tried, that they may reward him in proportion as he may ſeem intitled to it." But Dr. R—— adds, that "whether he may be thought worthy of any recompence, or not, he very chearfully ſubmits it to the trial of the curious; and hopes, they may reap the ſame advantages, he did laſt year, by clearing their trees of theſe pernicious inſects." The doctor then proceeds as follows, to give the relation of Mr. Bradford's invention and ſucceſs. "The firſt tree he tried the experiment upon, was a favourite plum-tree: I think a green gage. He was afraid of trying it on the whole body of the tree at firſt: as he did not know, but that it might kill it at once: and therefore he ſelected out a particular branch, that was deſigned to be cut quite away, at the winter pruning, for the ſubject of his firſt eſſay. The method of the experiment is this: he took a ſmall awl, and pierced, ſloping, through the rind, and into part of the wood of the branch, but not to the heart or pith of it; and poured in a ſmall drop or two of quickſilver; and ſtopt it up with a ſmall wooden plug made to fit the orifice: and the reſult of this experiment was, that the inſects all dropt off, from that very branch, the next day; and, in a day or two more, from off the other branches of the tree, without any other puncture: and the tree continued in full vigour; and throve well all the ſummer after. Encouraged by this ſucceſs of the firſt eſſay, he next tried it upon a honey-ſuckle; the leaves of which were quite covered with them: and here he ſcraped away the top of the ground with a trowel; and run his awl, in the ſame ſloping manner, into the main ſtem juſt above the roots; but with the ſame caution as above, not quite to the inner pith; and the ſucceſs was the ſame as before. The inſects all dropt off dead the next day after the experiment was made. The above facts you may ſafely depend upon: and I ſaw both the trees, on which the experiments were made, ſince Chriſtmas laſt; and they then ſeemed to be both very healthy and well. I did not indeed, ſee the operation performed, as I was at that time on my reſidence at L——; but the method, manner, and ſucceſs, as above related, I had from Mr. Bradford's own mouth."

This letter from Dr. R——, was dated March 11, 1765, though the delivery of it to the ſociety was deferred from accident till February laſt. But Dr. P——, in his letter to the preſident, deſiring him to lay the other before the ſociety, remarks, that experiments have been ſince made, which confirm the firſt obſervations. He ſays, "the advantage, however, hath ariſen from this delay, that Dr. R—— hath had fuller proof of the ſucceſs of this diſcovery."

We ſhall only add, that this method has ſince been tried by ſeveral members of the ſociety, and found fully to anſwer the intended purpoſe.

QUINCUNX, a diſpoſition of trees originally formed into a ſquare, conſiſting of five trees, one at each corner, and a fifth in the middle; which diſpoſition often repeated forms a regular grove, and then viewed by an angle of the ſquare or parallelogram, repreſents equal and parallel alleys.

QUIT-RENT, a ſmall rent payable by the tenants of moſt manners, whereby the tenant is quit, or free, from all other ſervices; and is ſaid to be an acknowledgment of their ſubjection to the lord of the manor.

QUITTOR, an ulcer formed between the hair and hoof, uſually on the inſide quarter of a horſe's foot; it often ariſes from treads and bruiſes, ſometimes from gravel, which by working its way upwards, lodges about the coronet: if it is only ſuperficial, it may be cured with cleanſing dreſſings, bathing the coronet every day with ſpirit of wine, and dreſſing the ſore with precipitate medicine.

But if the matter forms itſelf a lodgment under the hoof, there is no way then to come at the ulcer, but by taking off part of the hoof; and if this be done artfully and well, the cure may be effected without danger.

When the matter happens to be lodged near the quarter, the farrier is ſometimes obliged to take off the quarter of the hoof, and the cure is then for the moſt part but palliative; for when the quarter grows up it leaves a pretty large ſeam, which weakens the foot: this is what is called a falſe-quarter, and a horſe with this defect, ſeldom gets quite ſound.

If the matter, by its confinement, has rotted the coffin-bone, which is of ſo ſoft and ſpongy a nature, that it ſoon becomes ſo, you muſt enlarge the opening, cut away the rotten fleſh, and apply the actual cautery, or hot iron pointed pyramidically, and dreſs the bone with doſſils of lint, dipped in tincture of myrrh, and the wound, with the green, or precipitate ointment. When the ſore is not enlarged by the knife, which is the beſt, and leaſt painful method, pieces of ſublimate are generally applied, which bring out with them cores, or lumps of fleſh: blue vitriol powdered, and mixed with a few drops of the oil, is uſed alſo for this purpoſe, and is ſaid to act as effectually, and with leſs pain and danger. *Bartlett's Farriery, page* 303.

R.

RABBIT, a well known animal of the hare kind, with a very ſhort tail.

The female or doe rabbit goes with young thirty days, and then ſhe kindles; and if ſhe take not bucks preſently ſhe loſes her month, or at leaſt a fortnight, and often kills her young and eats them.

In England they begin to breed at a year old, but in ſome places much ſooner; and they continue breeding very faſt from the time when they begin, four, five, ſix, or ſeven times a year being common with them. They have uſually from four to ſeven in a litter, and hence it is that a ſmall number at firſt will ſoon ſtock a whole warren, if left to breed a little while undiſturbed. The does cannot ſuckle their young till they have been at buck again: this therefore is to be done preſently, elſe there is a fortnight loſt of the time for the next brood, and the preſent brood alſo probably loſt. When the buck goes to the doe, he always beats and ſtamps very hard with his feet, and, when he has copulated with her, he falls backwards, and lies as it were in a trance; in this ſtate it is eaſy to take him, but he ſoon recovers from it.

The buck rabbits, like our boar-cats, will kill the young ones, if they can get at them; and the does in the warrens prevent this, by covering their ſtocks, or neſts, with gravel or earth, which they cloſe ſo artificially up with the hinder part of their bodies, that it is hard to find them out. They never ſuckle the young ones at any other time than early in the morning, and late at night, and always, for eight or ten days, cloſe up the hole at the mouth of the neſt, in this careful manner, when they go out. After this, they begin to leave a ſmall opening, which they increaſe by degrees, till at length, when they are about three weeks old, the mouth of the hole is left wholly open, that they may go out: for they are at that time grown big enough to take care of themſelves, and to feed on graſs.

People who keep rabbits tame for profit, breed them in hutches, but theſe muſt be kept very neat and clean, otherwiſe they will be always ſubject to diſeaſes. Care muſt be taken alſo to keep the buck and does apart till the latter have juſt kindled, then they are to be turned to the bucks again, and to remain with them till they ſhun and run from them.

The general direction for the chooſing of tame rabbits is, to pick the largeſt and faireſt; but the breeder ſhould remember, that the ſkins of the ſilver-haired ones ſell better than any other. The food of the tame rabbits may be colewort and cabbage leaves, carrots, parſnips, apple-rinds, green corn, and vetches, in the time of the year; alſo vine leaves, graſs, fruit, oats, and oatmeal, milk-thiſtles, ſow-thiſtles, and the like; but with theſe moiſt foods they muſt always have a proportionable quantity of the dry foods, as hay, bread, oats, bran, and the like, otherwiſe they will grow pot-bellied, and die. Bran and grains mixed together have been alſo found to be very good food. In winter they will eat hay, oats, and chaff, and theſe may be given them three times a day; but when they eat green things, it muſt be obſerved that they are not to drink at all, for it throws them into a dropſy. At all other times a very little drink ſerves their turn, but that muſt always be freſh. When any green herbs or graſs are cut for their food, care muſt be taken that there is no hemlock among it, for, though they will eat this greedily among other things, when offered to them, yet it is ſudden poiſon to them.

Rabbits are ſubject to two principal infirmities. Firſt, the rot, which is cauſed by the giving them too large a quantity of greens, or from the giving them freſh gathered, with the dew or rain hanging in drops upon them. It is over moiſture that always cauſes this diſeaſe; the greens therefore are always to be given dry, and a ſufficient quantity of hay, or other dry food, intermixed with them, to take up the abundant moiſture of their juices. On this account the very beſt food that can be given them, is the ſhorteſt and ſweeteſt hay that can be got, of which one load will ſerve two hundred couples a year; and out of this ſtock of two hundred, two hundred more may be eat in the family, two hundred ſold to the markets, and a ſufficient number kept in caſe of accidents.

The other general diſeaſe of theſe creatures is a ſort of madneſs: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This diſtemper is ſuppoſed to be owing to the rankneſs of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called tare thiſtle, to eat.

The general computation of males and females is, that one buck rabbit will ſerve for nine does; ſome allow ten to one buck, but thoſe who go beyond this always ſuffer for it in their breed.

The wild rabbits are to be taken either by ſmall cur dogs, or by ſpaniels bred up to the ſport; and the place of hunting thoſe who ſtraggle from their burrows is under cloſe hedges, or buſhes, or among corn-fields and freſh paſtures. The owners uſe to courſe them with ſmall greyhounds, and, though they are ſeldom killed this way, yet they are driven back to their burrows, and are prevented from being a prey to others. The common method is by nets, called purſe-nets, and ferrets. The ferret is ſent into a hole to force them out, and the purſe-

purſe-net, being ſpread over the hole, takes them, as they come out. The ferret's mouth muſt be muffled, and then the rabbit gets no harm. For the more certain taking of them, it may not be improper to pitch up a hay net or two, at a ſmall diſtance from the burrows that are intended to be hunted: thus very few of the number that are attempted will eſcape.

Some who have not ferrets ſmoke the rabbits out of their holes with burning brimſtone and orpiment. This certainly brings them out into the nets; but then it is a very troubleſome and offenſive method, and is very detrimental to the place, as no rabbit will, of a long time, afterwards come near the burrows which have been fumed with theſe ſtinking ingredients.

"Having heard, ſays Mr. Weſton, that a perſon had kept rabbits, by digging a circular ditch, and confining them to a little hill in the middle, I from that deſcription took the hint, and made a ſmall artifical warren, in a lawn in the garden, in the following manner. It was a very agreeable object, and the rabbits ſucceeded very well in it.

"Pare off the turf of a circle, about forty feet diamater, and lay it on the outſide; then dig a ditch within this circle, the outſide perpendicular, the inner ſloping, and throw earth ſufficient into the middle, to form a little hill, two or three feet higher than the level of the lawn; the reſt muſt be carried away. Then lay down the turf on the hill, and beat it well to ſettle it.

"The ditch at bottom ſhould be about three feet wide, and three and an half deep, with two or three drains at the bottom, covered with an iron grate, or a ſtone with holes, to carry off the haſty rains, in order to keep the rabbits dry. In the outſide bank ſhould be ſix alcoves, the ſides and tops ſupported, either by boards, or brick work, to give the rabbits their dry food in; by their different ſituations, ſome will always be dry, ſix boxes, or old tea cheſts, let into the bank, will do very well.

"If the ground be very light, the outſide circle ſhould have a wall built round it, or ſome ſtakes, driven into the ground, and boards or hurdles nailed to them, within a foot of the bottom, to prevent the bank from falling in. The entrance muſt be, either by a board, to turn occaſionally acroſs the ditch, or by a ladder.

"The turf being ſettled, and the graſs beginning to grow, turn in the rabbits, and they will immediately go to work, to make themſelves burrows in the ſide, and in the hill. By way of inducing them rather to build in the ſides, to keep the turf the neater, make a ſcore of holes, about a foot deep, and they will finiſh them to their own mind; and if there be a brick wall round it, it ſhould be built on pillars, with an arch from each, to leave a vacancy for the burrow.

"Another way is, to dig the ditch only about two feet deep, which will yield about earth enough to make the hill; put ſome pales, about a foot high, on the outſide; for that will be a ſufficient height to keep the rabbits in.

"Feed them as other tame rabbits are fed; and in wet weather, ſprinkle ſaw duſt at the bottom, by which means, the quantity of manure will be encreaſed: once a week is often enough to take it away, the quantity will be ſurprizing; nor will the ſmell be in the leaſt offenſive, even though it be quite cloſe to the houſe. In a very large lawn, two or three of theſe hills, with the rabbits feeding on the tops, will not be unpleaſing objects.

"If the bucks happen to be miſchievous, in killing the young ones, they muſt be chained in an alcove; or elſe have their liberty, as in a warren.

"After a great ſnow, they will want ſome aſſiſtance, early the next morning; becauſe the ditch will be near filled, and perhaps the alcove, where the hay is, will be blocked up.

It is a great improvement to caſtrate the young bucks, and keep them till they are full grown, before you kill them; the fleſh will be amazingly finer, whither, and tenderer. But then it will be beſt to take them away, and keep them in another warren, leaſt they ſhould be too numerous, and diſturb the breeding does; or elſe have a few hutches in the alcove, to fatten them in.

"As oil cakes are found of great uſe in fattening cattle, it is probable they would be as uſeful in fattening rabbits: it is aſſerted, that ſome of the oil mixed with the pollard, or buck-wheat, is cheaper than the cakes; never having made the experiment, I cannot aſcertain its ſuperior advantages.

"There ought to be one buck to every eight or ten does; and attention ſhould be had to the breeding thoſe ſorts, whoſe ſkins are in the greateſt eſteem with the furriers and hatters. Theſe ſkins are generally of more value than the fleſh, eſpecially in the winter, againſt which time contrive to have the greateſt quantity of theſe fattened bucks.

"Where does are kept in hutches, they are ſuppoſed to breed ſix times in a year, and only five young ones are left to each, which are thirty from each doe: but as theſe are in a more natural way, and the young ones difficult to be gotten at, let us ſuppoſe about thirty-ſix to be produced from each doe, reckoning only ſevenpence for each; there is a guinea profit from each doe; as the additional value of the ſkins in winter, and the dung, will more than pay the expence of food, and attendance on them.

"It is quite neceſſary, that thoſe who keep many rabbits, ſhould cultivate ſome lucern, parſley, and carrots, as no other vegetables are ſuch proper food for them as theſe: they ſhould alſo be fed on ſome of the beſt upland paſture hay; for if it be coarſe, ſo far from eating they will waſte it. Lucern hay is very proper for them.

"If a warren be made on the ſame plan for hares, it ought to be much larger, and ſome furz and thorns planted on it, for cover for them, but if there be not ſeveral rods of ground in it, there will be no chance of their breeding: therefore the warren can only be ſupported, by turning leverets into it." *Weſton's Tracts, page* 133.

RACK, a wooden frame made to hold hay or fodder for cattle.

RADICLE, that part of the ſeeds of plants, which upon vegitating becomes its root, and is diſcoverable by the microſcope.

Woollen RAGS, and the nippings of the pitch-marks upon ſheep, are ſingularly good manure. The rags ſhould be chopped ſmall, about an inch or two ſquare, and ſcattered on the earth at the ſecond ploughing; for being thereby covered, they will begin to rot by ſeed-time They imbibe the moiſture of dews and rain, retain it long, and, as Dr. Home obſerves, thereby keep looſe ſoils in a moiſt ſtate. They coſt about four-pence a buſhel

buſhel at London, from whence many loads are ſent every year to Dunſtable, which is thirty-three miles, where they are laid even on ſtiff-lands, juſt after the ſowing of the corn, allowing to the acre four ſacks of ſix buſhels each.

RAG-WORT, or as it is called in Yorkſhire, *ſeagrim*, is a very pernicious weed.

The reverend Mr. Comber, of Eaſt-Newton, has obliged the public with the following obſervations on the growth and deſtruction of ragwort, or ſeagrim.

"This plant, ſays he, has a ſtalk, in its early ſtate, green, but, as it advances in age, inclining to violet or purple, eſpecially downwards. Its flowers are yellow, and thick-ſet, and compoſed each of a number of ſmall-pointed leaves. It runs to ſeed in the latter end of ſummer. The ſmell, both of the ſtalk and leaves, which are jagged, (whence probably it obtains one name) and the flower itſelf, are offenſive to all animals, I think; for I have obſerved that hardly any creatures feed upon it, except almoſt ſtarved. I have not indeed obſerved whether or no aſſes reject it.

"Like moſt other weeds, it thrives beſt in the beſt ſoils, either natural or artificial; and I took up a plant of it in my orchard, about two years ago, (with the root) which, when in flower, touched my chin, (my height is about five feet eight or nine inches) and its root, which is round, and thick ſet with taws, was much larger than a new-born child's head: but the uſual dimenſions are much leſs than theſe.

"About four years ago, I obſerved the ſpreading of this weed in that part of this eſtate which was in our own hands. I took notice, that neither cows nor horſes eat it; and when I ſmelled it, I ceaſed to wonder that they did not. It was obvious to remark, that a weed ſo bulky as this, and ſo groſs muſt extract much nouriſhment from the earth, and that it was adviſable to get rid of it as faſt as poſſible. The moſt eaſy method was mowing, I therefore ordered a ſervant to mow theſe weeds in the paſtures as near to the ground as he could; and I hoped that the common mowing in the meadows would be ſufficient to deſtroy them: but I ſoon found my miſtake; for in a very few weeks theſe offenſive ſtrangers ſhot up again in a ſtalk and leaf, and even flower, though all in much ſmaller ſize than before, but with this diſagreeable circumſtance, that the root was ſo far from being injured with the ſcythe, that for one ſtalk ſeveral aroſe, and the roots ſeemed to have gained new vigour from the wound.

"I now applied myſelf to plucking up by the roots theſe odious inmates, and found new difficulties; for while the ground was dry, as it uſually is in the latter end of ſummer, I found the ſtalks of ſuch of the ſeagrims as were longeſt, and afforded the tighteſt graſp, either break in plucking, and leave the root in the ground entirely, or at beſt bring with it only a ſmall part of the root; and when the wet weather came on, and looſened the ground, and made it poſſible, or even eaſy, to bring away the whole bail of the root, yet the ſeaſon of ſeeding was come on alſo, and the earlieſt ripe ſeeds had diſperſed themſelves, and produced an aſſurance of a larger crop for ſucceeding years than the moſt careful plucking of the preſent crop could deſtroy.

"But if theſe were the difficulties which attended my attempts to eradicate thoſe ſeagrims, which had happened not to be mowed, I was much more embarraſſed by thoſe which had been; for here it was impoſſible to get any ſuch faſt hold, as to pluck them up with much, or even any root.

"I now applied myſelf to enquire what gentlemen or farmers were plagued with this weed, and what methods they had tried with ſucceſs to deſtroy it.

"I was told by a gentleman in my own neighbourhood, that Sir G. Cayley, of Brompton, near Scarborough, baronet, had been plagued with this weed, and had purſued the method of plucking with ſucceſs.

"Animated by this aſſurance, I reſolved to purſue this method with great attention; and as it ſeemed to be a work which required great care, both in the choice of ſeaſon and manner of plucking, I reſolved not to depute the work to others, but to endeavour to clear a ſpot in my cow-paſture with my own hands, that, if my labour ſucceeded, I might employ others to follow the ſame method under my own eye in the reſt of this paſture.

"Accordingly, in the evenings of the ſummer, or rather autumn, of 1762, after ſhowers, I applied myſelf to this work; and by the help of a pair of ſtrong gloves, and a tight graſp, I brought up almoſt every root, in a ſpace of about two hundred yards ſquare, whole; ſo that I had good hopes I ſhould ſee this ſpot clear in the ſucceeding ſummer. It is true, I ſaw leaves of the ſpecies of this weed, and of a very vivid green too, around the plants which I pulled up: but as I reaſonably concluded theſe to be fed by the taws which ſpread themſelves from the main root, ſo I (methought reaſonably) concluded alſo, that this main root being deſtroyed, the ſide taws would die, and conſequently theſe young leaves.

"But how was I diſappointed, when in the ſummer of 1763, I ſaw this ſpot of ground as much over-run with ſeagrims as any part elſe of the paſture which had been unpulled!

"Converſing, however, with G. Watſon, of New Malton, Eſq; towards the latter end of ſummer, on this ſubject, I was aſſured by him, that by a repetition of this labour of plucking for ſome years, he thought he had leſſened the number of his ſeagrims, though they were ſtill numerous. Urged by this example, I have gone through the whole of my paſture, which is about ten acres, and kept five cows, at the latter end of laſt ſummer, of 1763, with the ſame care as was uſed to a ſmall part of it in 1762; yet am I not elated with much hope of ſucceſs; for a little plot before my garden (in which my horſes run, and which was managed with ſtill more accuracy on account of the odious appearance of the ſeagrims from my windows) ſeems to threaten another conſiderable crop.

"As I did not confine my enquiries about the method of deſtroying this hateful weed to any one rank of men, I was told by an honeſt quaker, a farmer in my neighbourhood, that he had found turning of ſheep in winter into his cow-paſture the only effectual method of deſtroying this hateful weed.

"I thought this method very likely to ſucceed; for ſheep are ſuch cloſe eaters, that I have known them deſtroy whole beds of the rankeſt docks, which could not be killed by any other means.

"I have not been able to try this experiment conſiderably; for, as I am raiſing quick fences, both in my meadow and paſture, I keep no ſheep. I have, however, occaſionally admitted ſome of my tenants ſheep into the ſmall plot before my garden this winter; and, upon an accurate

accurate examination this morning, I do not entertain any ſanguine hopes of great ſucceſs from this method. I find that many of the young leaves of this weed, now level with the ſurface of the ground, are untouched by the ſheep; and that ſuch others as appear bitten by them, do not ſeem in a dying condition.

"The truth ſeems to me, that ſheep, though they may not have the ſame averſion to this weed as horſes and cows, yet are far from being fond of it; and if any great ſucceſs is to be hoped for from their bite, (which may prepare beds for the water, and ſo decay the root) the ſheep ſhould be folded pretty cloſe upon it, and obliged to eat it near, and at ſuch a ſeaſon that the winter rains may have time to work its deſtruction. And ſuch a method, if carefully purſued, ſeems to be moſt probable for the extirpation of this pernicious weed.

"If the method of plucking is followed, I would ſubjoin ſome cautions.

"Firſt, In order to prevent the large plants from ſeeding, I would adviſe to cut off all the tops, and the tops only, when the flowers begin to die, that then good hold of the ſtalk may be gotten.

"Secondly, I would defer the plucking till the rains have moiſtened the ground ſufficiently to bring up the whole main root.

"Thirdly, I recommending ſtriking the root ſo brought up againſt the ground, in order to diſperſe the earth which adheres to it, by way of manure.

"Fourthly, I always pile the plants thus pulled up and cleanſed from earth, that, if the ſeaſon prove favourable, they may be burnt, and the aſhes ariſing from them ſpread on the ground; or if this cannot be conveniently done, (though it is much the better method, and may, with a ſufficient fire, be done when they are ever ſo green) left to rot and manure the ſoil.

"The groſſneſs, and even ſtench, of this weed, is a proof of the great quantity of ſalts it contains; and in the ſame proportion as any plant exhauſts the ground of its ſalts, it repays when reduced to manure. There can, however, be no queſtion, but whilſt weeds are left to rot, a great quantity of the ſalts, which by burning would mingle with the ſoil, are carried into the air.

"I ſuppoſe your readers will be curious to know in what manner I account for the ſudden appearance of ſeagrims in vaſt abundance, in this eſtate, where they were hardly ever known before.

"I will give you an account, which, I dare ſay, you will eſteem perfectly ſatisfactory. About eight years ago I undertook to improve a piece of ground of about fourteen acres, which was over-run with thorns of both ſorts, brambles, broom, and furze.

"When I had got it cleared of all this traſh, my next buſineſs was to pare the hills off, and pile them, and, after a winter's mellowing, to break and ſpread them with a mixture of lime, and all other kinds of manure which I could collect. As the ſoil was very poor, having been exhauſted by the great quantity of traſh it had nouriſhed for many years, I was not yet ſatisfied, but reſolved to take the advantage of the firſt dry ſummer, to lead out the riches of a pond of about thirty yards long and half as many broad, which had been occupied by a great number of geeſe, &c. and never thoroughly cleaned during near thirty years. I got through this work, though at a great expence, being obliged to employ a conſiderable number of draughts, leſt the rains ſhould make the mud too thin, or the heat bake it too much, the mud being for a conſiderable ſpace a yard perpendicular.

"All this mud I laid on my newly-improved ground, except a few cart-loads, which were brought and laid by the wall of a kitchen-garden, to be mingled with the other ſoil.

"I had divided my improved ground, reſerving about four acres for meadow.

"Behold! the ſucceeding year gave me a crop of ſeagrims both in my new meadow, my new cow-paſture, and the plot of ground in which the mud for my garden had been ſcattered; and more particularly on thoſe parts where the ground had been broke, either to ſtub the thorns, &c. or to take away the hills, while the adjoining ground on each ſide was free from this pernicious weed.

"As I knew little or nothing of this weed, I ſuffered it to ſeed before I took any neceſſary precautions for its deſtruction. The ſucceeding year preſented me with a much larger crop, and I have been ever ſince ſtruggling for its extirpation, and have the mortification to ſee its encroachments on adjoining grounds by the ſeeds which winds have carried.

"This fact and another of the ſame kind, in a piece of ground which I improved ſince, at ſome diſtance from the former, have confirmed me in an opinion, which I before thought very probable, viz. "That all ſoils are originally impregnated with the ſeeds of almoſt all graſſes and weeds, (though of ſome in greater quantities) which only want a proper ſtirring and manure to awaken them to vegetation, though at the expence of one another, ſome being ſuffocated by that proceſs which gives life to the others."

"I will add another ſtriking inſtance in confirmation of this ſentiment, notorious in this neighbourhood.

"A conſiderable quantity of the park at Gilling was over-run with brakes and moſs, and that wretched graſs which grows in ſuch company. Lord Fairfax, the owner, finding that he could not have his veniſion fat as it ought to be, deſtroyed his park, and applied himſelf ſeriouſly to the improvement of it at a vaſt expence. In courſe of time by due tillage he brought this worſt part of it to be not only good corn-land, but even tolerable, though coarſiſh, meadow and paſture; yet both of them thick ſet with ſeagrims, a weed never ſeen there till the quantity of lime which his lordſhip put into that poor ſoil had warmed it ſufficiently.

"I have only to add, on this ſubject, that I am perſuaded ſeagrim does more harm in meadow than paſture land; for in the latter it only exhauſts the ground, on which it ſtands, to no good purpoſe; but in the former it communicates its diſagreeable ſtench in the ſweat to the good hay, and deſtroys its ſweetneſs. I adviſe, therefore, that hay makers be ordered to throw it with their rake-ſhafts out of the ſwarthe whenever they meet with it." *Muſeum Ruſticum, vol. V. page* 117.

RAM, the male of the ſheep kind. *See the article* SHEEP.

A correſpondent of the editors of the Muſeum Ruſticum has obliged the world with the following method of gelding rams.

"It was, ſays he, a long time before I came into a proper method of gelding my rams: I uſed, like my neighbours, always to employ a common gelder, who cut and ſeared them; however, I obſerved that this not only put

the animal to great pain, but was a conſiderable time before it healed, and the ſheep or lamb always loſt fleſh in no ſlight degree.

"Whilſt I was muſing how to improve this practice, a friend of mine, a farmer, who came accidentally to ſee me, out of Bedfordſhire, adviſed me to leave off gelding my rams in the manner I had practiſed, and, inſtead of it, to have them knitted.

"The method of doing this he deſcribed as follows. Firſt take ſome ſmall, yet ſtrong, twine, not too hard twiſted; add three of theſe together, and ſlightly twiſt them on your knee, as the ſhoemakers do their thread; then wax it well with ſhoemakers wax, and it is ready for uſe.

"When you are thus prepared, take a proper length of this twine; tie each end of it to a ſhort bit of ſtick, as thick as a walking-cane; then put it round the cod, and tying a ſingle knot, do you take hold of one ſtick and draw it, whilſt another man draws the other, as tight as you well both can; for on the tightneſs of the drawing depends the ſucceſs of the operation.

"The animal immediately loſes all ſenſe of feeling in the cod, the circulation of the blood thither is ſtopped; and if it was to be let alone, it would rot off, but this is a bad, as well as a naſty and dangerous practice, for the ſheep ſometimes die of the ſtench.

"The beſt way is, at the end of nine days, to cut off the cod; but then you muſt take a great deal of care you do not cut it too cloſe to the tying; if you do, the ſtring may chance to ſlip off, and the conſequence be dangerous as by ſuch a neglect many ſheep may be loſt in a ſeaſon.

"Many farmers, I am informed, when they knit their rams, truſt to the ſtrength of one man's arms; and this may ſometimes be well enough, when your workman is ſtrong, attentive, and willing; but if he is failing in any of theſe points, ten to one but an accident happens: I therefore always chuſe to employ two men at this work.

"The ſeaſon I chooſe is the ſpring of the year, though ſome prefer November, after the ramming ſeaſon is over: I have many reaſons for this preference, and particularly, I think that the warm weather coming on, hinders them from pining, or falling off their fleſh, and ſoon re-eſtabliſhes them in their perfect health. When this operation is performed in November, and the winter is either wet or froſty, the ſheep are pinched by the cold, and pine away conſiderably, not having that heartening food, to keep them in ſpirits, as they meet with in the ſpring of the year.

"I have obſerved, that if the rams are not in good fleſh, or have not been pretty well fed, they do not undergo this operation ſo well: I therefore always take care to keep them particularly well ſome time before, and alſo ſome time after the buſineſs is done. This is an attention by no means thrown away, for without it ſome miſcarriages may happen, which would otherwiſe be avoided.

"When I ſay I prefer knitting my rams in the ſpring, I mean before the hot weather comes on; as to the particular time, I am governed by the ſeaſon: if it is deferred till ſummer, the flies will ſurely be troubleſome." *Muſeum Ruſticum, vol.* IV. *p.* 159.

In a ſucceeding number of the ſame work, another correſpondent has laid down the following method, which he thinks preferable to the former. He declares he has practiſed it for ten years, and in that time he had not loſt a ſingle one by gelding, out of ſeveral hundreds; neither do they loſe fleſh: on the contrary, ſome of them, that did not thrive before, rather fatten better after, if the paſture does not fail. The ſucceſs he imputes to the evacuation of the humours, by cutting the ſcrotum, &c. may be the occaſion of it.

"What, ſays he, is neceſſary to be obſerved, by way of caution, is as follows. When I am about to have my lambs gelt, I take dry freſh weather to do it in; for which purpoſe I defer it until they are about two months old, which brings, at leaſt, the middle of May for that work to be performed in; but, in order to have a ſettled ſtate of weather, and the moon in decreaſe, I do it either a little ſooner, or a fortnight later, when I judge the work may be done with ſafety, according to the above caution.

"I have the lambs put into fold that has a good wall, or dyke, about it, by ſeven or eight o'clock in the morning or as ſoon as the dew is off. A man is appointed to ſtand within the fold, with his back againſt the wall or dyke, who may be called the holder: another is appointed to take the lambs, one at a time, taking care not to heat them either in folding or taking them.

"When he has taken a lamb, he brings it to the holder, who takes it by the hinder houghs, and preſſes its back, againſt his breaſt, with its head over his ſhoulder: the operator then, who generally is the ſhepherd, takes his knife, and cuts about an inch from the lower end of the cod quite off: he then puts one of his hands cloſe up to the creature's belly, while he preſſes back the cod with the other; and by that means he cauſes the bare ſtones to put out, ſo that he can eaſily gripe them one at a time with his teeth, and pulls them ſlowly out.

"He then takes a little ſalt water, which is prepared on purpoſe, and ſet near him, into his mouth, and warms it a little; then he ſquirts it up the cod, and all is done; the holder handing the lamb over the wall, or dyke, to one that ſets it on its feet on the other ſide, pulling its tail pretty hard when he lets it go, which makes it ſtretch itſelf out.

"Thus, in half a minute, a lamb is gelt; and in three or four days all danger is over, if kept from lying on nettles, and the like.

"It is proper to walk the lambs gently about three or four hours after they have been half a day gelt.

"If old rams are to be gelt, I do it about the ſame ſeaſon; and the operator takes no other method than that uſed with the lambs, only putting a bit of ſalt and butter up the cod inſtead of ſquirting up a little ſalt water: the holder, indeed, muſt not now ſtand, but ſit on the ground, griping the ram by the houghs, while he lies on his back, with his head over one of the holder's thighs, &c.

"My reaſons for letting the lambs be about two months old before they are gelt, beſides the reaſon before given, are, that at that age they are better able to bear the pain of the operation than when they are young and weakly; and the ſtrings, as they are called, are ſo ſtrong that they do not break, but come entirely out along with the ſtones, which makes a free paſſage for matter to iſſue out by the cod; whereas, when they are gelt very young, as is the practice with ſome, the *tunica albuginea*, or ſtrings as they are vulgarly called, being but weak, they often break, probably occaſioning inflammations, &c. which certainly ought to be avoided, if poſſible. This occaſions more to

die,

die, when they are gelt young, by the operation, than when cut at two months old.

"I mentioned having the moon in decreaſe when I have my lambs, &c. gelt, which by ſome, perhaps, will be thought a circumſtance not worth notice: but let ſuch only attend to the wonderful effects the luminaries have on fluids, as well the juices of the animal œconomy, as others, when they are in the poſitions that conſtitute new and full moon; and they will, I dare ſay, be diſpoſed to think the hint is not quite impertinent.

"The reaſonableneſs of my concluſion is not deduced from argument only, but has the authority of experiment, as follows:

"I attempted to geld my lambs, one year, juſt at full moon: the firſt lamb that was cut bled very ſorely; the next did the ſame. I tried as far as half a dozen, and none of them were otherwiſe. I then apprehended there was danger, ſo deferred cutting any more for five days, when there was a great abatement in the bleeding: beſides, one of the ſix gelt at full moon dropt, and none of the others that were gelt five days after did, although they were above twenty times the number of the former (the weather and uſage were nearly the ſame.) This, I own, carried conviction enough for me. Thoſe that will not be convinced by my relation of this fact, I, notwithſtanding, do heartily wiſh them no worſe luck than I have had in that way; but withal they had as good uſe circumſpection. *Muſeum Ruſticum, vol.* IV. *page* 331.

RAPE, the name of a plant much cultivated for its ſeed, and alſo as a food for cattle. *See the article* COLE.

In 1769, Mr. Baker began to make ſome experiments upon rape, but theſe were only ſmall; in 1770, he extended them furthur, upon land which he thus deſcribes. "A ſhallow ſoil, of a ſtrong adheſive nature when wet, and when perfectly dry, in lumps, almoſt impregnable; but between wet and dry, reducible. It lies upon a bed of limeſtone quarry and has a natural declivity to the north-weſt; naturally very poor, and I believe never received any manure until I dreſſed it. Three acres of this land was in 1768, under potatoes, in the ordinary method of the country, in ſeven feet beds, and *four* feet trenches. In 1769, it was under drilled turnips.

"The froſt, ſnow, hail and rain which we had this year in the months of March and April, rendered it impoſſible to get the ground in any tolerable condition for the rape ſeed, before the 28th day of April. On that day twenty broad ſets were ſown, with twelve ounces of rape ſeed to each ſet, or ridge. I intended to have ſown it earlier, but the event will ſhew, that as it was, I ſowed it too early, at leaſt upon *this* ground.

"It was ſlow in coming up, and made but a poor figure until July. After which it ſhot forward; but inſtead of affording a plentiful mowing crop for the purpoſe of foddering cattle: it ſoon began to run up very faſt, broke out into branches, with few and ſmall leaves, like rape in bloſſom from autumn ſowing, but with ſtrong branches and few leaves; and in a ſhort time after, began to grow hard, pipey, and the ſeed to form.

"In September, I began to mow it for cattle, and they eat it with great eagerneſs, but every day it became worſe, by growing harder, inſomuch, that before it was exhauſted, there was very great waſte, as to the object of fodder, but it wonderfully raiſed the dunghil, which in my mind is of the firſt moment to the farmer: for if he has manure in plenty, and diſpoſes of it judiciouſly, there is hardly any thing he need to fear, except climate.

"It was pretty far in October, before all this rape was cut (and the ſeed coming forward very faſt) although it was brought home in great profuſion. It was ſo ſtrong, that the mowing of it could not be accompliſhed with a common ſcythe; it would have broken an hundred; but I have by me a ſhort, ſtrong ſcythe, with a thick back, intended to mow buſhes, and other rubbiſh: with this inſtrument I got it mowed, but not ſo cloſe to the ground as I wiſhed, it being next to impoſſible to mow ſuch ſtrong plants as theſe were, cloſe to the ground; and I became the leſs ſolicitous about it, as from the ſtrength of the rape ſtumps and roots, and the weeds which were upon the ground, owing to the rape ſhooting up in tall ſtems, I gave up my intention of ſowing the ground with wheat, as was originally intended. Hence I conclude, that the rape was ſown much too early.

"On the 16th of July, I tranſplanted ſome of this rape; in rows upon ridges four feet wide; theſe plants flouriſhed much better than the former, and were at leaſt four times the ſize of any of thoſe left in the ground where they were ſown. Nevertheleſs, theſe alſo ran to ſeed; but the cold nights coming on, prevented their forming their ſeed like the former. They were vaſtly more ſappy, and much better food for cattle.

On the 24th of July, I drilled rape ſeed upon the ſame ground.

No. 1. Six ridges four feet wide, and thirty-two perches long in ſingle rows.

2. Six ridges the ſame length and breadth, in double rows, ten inches aſunder.

N. B. The double and ſingle rows were drilled alternately on the ſame ground, on the 18th day of July.

3. Six ridges, four feet wide and thirty-two perches long, drilled in ſingle rows.

4. Six ridges, the ſame length and breadth, in double rows, ten inches aſſunder.

N. B. Theſe were ſown in alternate rows, on the ſame ground, on the 24th of July.

The ſeveral rows were thinned the latter end of Auguſt, and twice horſe-hoed during the ſummer.

On the 3d of April, 1771, I had a row of each of theſe cut and weighed, and the produce was as follows.

		Ton	cwt.	qr.	lb.		Prod. p. Plantation acre. Ton	cwt.	qr.	lb.
No. 1.	Single row produced	1	2	1	11	Sown July 18th.	29	6	1	16
2.	Double row ditto	1	4	3	13		32	12	2	23
3.	Single row ditto	1	5	2	22	Sown July 24th.	33	14	1	26
4.	Double row ditto	1	6	3	25		34	18	0	6

"The laſt ſowing in July, we ſee, affords conſiderable greater produce than the firſt, for the plaineſt reaſon, that the earlier we ſow this ſeed, the ſooner it runs: and conſequently affords the leſs produce for our purpoſe of foddering cattle in the yards, for making dung, and ſeems to account very ſtrongly for the ſtate of our firſt experiment.

"The double rows produced uniformly more than the ſingle rows; and indicate that the double are to be preferred in drilling rape for foddering cattle.

Rape Seed ſown Broad-Caſt.

"On the 24th of July two acres were ſown broad-caſt, with ten pounds of ſeed to each acre, in the ſame field where the other experiments were carried on: but the ſoil not ſo ſtiff by a good deal, has abundantly fewer looſe ſtones in it, is very ſhallow, and poor, to an incapability of producing any thing to profit, without great aſſiſtance of manure.

"In July I manured it with the dung of my yard, conſiſting of that of horned cattle, horſes and ſwine. The dreſſing was indeed very high; about two ſmart one horſe cart loads to a perch. I having ever found, that one acre, highly improved, is much more valuable than five imperfectly handled, was the reaſon why I gave this poor piece ſo liberal a dreſſing.

"The rape came up but ſlowly for a time, as I find to be the nature of the plant, but at length it ſhot forward, and flouriſhed away: but in winter, it met with a fate which I was not aware of, nor did I expect. The wood-pigeons lay upon it prodigiouſly, and did it great damage. Some plants I obſerved, in the froſt, to appear as if they had been tinged: whether that was owing to the wounds given by the birds, and thereby giving the froſt the greater force, or whether it was owing entirely to the ſeverity of the froſt is not in my power to determine. However, very early in the ſpring, this rape ſhot forward, and as the days lengthened, the viſits of the pigeons were leſs frequent, until they totally left it.

"From this rape breaking out into bloſſom ſooner than I expected, I am inclined to believe, that the 24th of July is too early to ſow it, for our purpoſe of foddering cattle in the yard.

However, early in April, I began to mow this rape for the horned cattle, ſuch as cows, plough bullocks, young cattle, calves and ſwine. They all eat it with the greateſt eagerneſs, and were foddered with it every evening, until the 19th of May inclufive, and wheat ſtraw in a morning, ſave four calves of the preceding year; and they were foddered twice a day with rape, and had ſtraw before them alſo, and throve upon it vaſtly better than the other cattle; for no other reaſon, I believe, than becauſe they were allowed more than the others: in ſhort they were in ſuch order, that I dare be eve the butchers would have been glad to have had them for killing.

"I need not tell the farmer how neceſſary it is to be frugal of provender, in an harſh dry ſpring, as the laſt was, when he is like to be hard run with forty head of cattle, many of which I ſhould actually have been obliged to ſell, at ſo improper a ſeaſon, had I not been poſſeſſed of theſe two acres of rape.

"There is yet another circumſtance, which renders this a truly valuable fodder. The milk of the cows increaſed prodigiouſly; and the milk and butter were as good, ſweet, and well flavoured, I think, in every particular, as ever I taſted in June. Even the cream for the tea, appeared to be perfectly free from any foreign flavour. The cows got hay every day, in the ſame manner as I have in former years mentioned them to have, when feeding upon cabbages.

"The ſimplicity of the culture for rape, for this purpoſe of feeding cattle, I cannot but think a particular recommendation of it to the farmer, and the cheapneſs of the ſeed in purchaſe, or the eaſe with which he may raiſe it, are objects which cannot fail, I think, of being perſuaſive to him. And all perſons, who have annexed to their farms, any bog, or other waſte ground, the improvement of which, that can be executed by burning, might ſurely raiſe ſuch quantities of rape, for the purpoſe of mowing paſture, as would enable them to keep almoſt any number of cattle; by which they would not only be bringing in the waſte land, but making that the foundation of improvement to their ſound land, by the immenſe quantities of dung they might raiſe by this means, from the waſte land. Here the advantage to the cultivator would be double.

"On the firſt day of May, I had four perches of this rape meaſured cut for weighing. It was mowed, immediately drawn home, and weighed. The four perches afforded ſeven hundred and two quarters: multiplying this by forty, ſhews our acreable produce to be fifteen tons. The quantity indeed but ſmall. However, the ſeaſon in which it is to be had, renders it more than ordinary valuable, and I think bids fair to make it an object of huſbandry, as a paſture for cattle.

"This year Mr. Baker ploughed up ſix acres of wheat ſtubble, as ſoon as the wheat came off, harrowed it down the 12th, 13th, 14th, and 15th of September, then ſowed rape ſeed over the whole field, and gave it a light buſh harrowing. The rape came up very thin, and made ſo poor an appearance in the ſpring, that he ploughed up the field, and ſowed ſpring corn. This is a ſtrong indication, that but little is to be expected from ſowing rape upon wheat ſtubble; becauſe, after the wheat comes off, it ſeems to be too late in the year to ſow rape. But ſomething may be charged, as he obſerves, to the natural moiſture of the ſoil.

Recapitulation of Experiments on Rapes, as Paſture for Cattle.

			Ton.	cwt.	qr.	lb.
Exp. I.	April ſowing. Run, and did not anſwer the purpoſe ſought for.					
II.	Ditto tranſplanted. Alſo run, but not ſo ſoon as the other.					
III.	July 18, ſowing	Single rows produced per acre	29	6	1	16
		Double rows ditto	32	12	2	23
	July 24,	Single rows ditto	33	14	1	26
		Double	34	18	0	6
IV.	Ditto	Broadcaſt ditto	15	0	0	0
V.	September ſowing	on wheat ſtubble ditto	0	0	0	0."

Baker's report for 1771.

RAT, the name of a well known animal, very troublesome to the farmer, &c.

We ſhall here give the two following receipts, as they are ſaid to be effectual, for deſtroying rats.

The firſt has the ſanction of the Dublin Society, who on the 19th of November 1762, ordered a premium of five guineas to one Laurence O'Hara, for this diſcovery; which is, "one quart of oat-meal, four drops of rhodium, one grain of muſk, and two nuts of nux vomica finely raſped." This mixture is to be made up in pellets, and laid in the holes and places which the rats frequent.

The other receipt is thus: "Take of the ſeeds of ſtaves acre, or louſe-wort, powdered, one fourth part, and of oatmeal three parts; mix them well and make them up into a paſte with honey. Lay pieces of it in the holes, and on the places frequented by rats or mice, and it will kill ſuch of thoſe vermin as eat thereof." *Gent. Mag. March* 1763.

The firſt ſtep taken by rat-catchers, in order to clear a houſe, &c. of thoſe vermin, is to allure them all together to one proper place, before they attempt to deſtroy them; for there is ſuch an inſtinctive caution in theſe animals, accompanied with a ſurpriſing ſagacity in diſcovering any cauſe of danger, that, if any of them be hurt, or purſued, in an unuſual manner, the reſt take the alarm, and become ſo ſhy and wary, that they elude all the devices and ſtratagems of their purſuers for ſome time after. This place, where the rats are to be aſſembled, ſhould be ſome cloſet, or ſmall room, into which all the openings, but one or two, may be ſecured: and this place ſhould be, as near as may be, in the middle of the houſe, or buildings. It is the practice, therefore, to attempt to bring them all together in ſome ſuch place, before any attempt be made to take them; and, even then, to avoid any violence, hurt, or fright to them, before the whole be in the power of the operator.

The means uſed to allure them to one place are various: one of thoſe moſt eaſily and efficaciouſly practiſed is, the trailing ſome piece of their moſt favourite food, which ſhould be of the kind that has the ſtrongeſt ſcent, ſuch as toaſted cheeſe, or broiled red-herring, from the holes or entrances to their acceſſes in every part of the houſe, or contiguous buildings, whence it is intended to allure them. At the extremities, and in different parts of the courſe of this trailed tract, ſmall quantities of meal, or any other kind of their food, ſhould be laid, to bring the greater number into the tracks, and to encourage them to purſue it to the center place, where they are intended to be taken: at that place, where time admits of it, a more plentiful repaſt is laid for them, and the trailing repeated for two or three nights.

Beſides this trailing, and way-baiting, ſome of the moſt expert of the rat-catchers have a ſhorter, and perhaps more effectual, method of bringing them together; which is, the calling them, by making ſuch a kind of whiſtling noiſe as reſembles their own call; and by this means, with the aſſiſtance of the way baits, they call them out of their holes, and lead them to the repaſt prepared for them at the place deſigned for taking them. But this is much more difficult to be practiſed than the art of trailing; for the learning the exact notes, or cries, of any kind of beaſts or birds, ſo as to deceive them, is a peculiar talent, not eaſily attained to in other caſes.

In the practiſing either of theſe methods, of trailing or calling, great caution muſt be uſed, by the operator, to ſuppreſs and prevent the ſcent of his feet and body from being perceived; which is done by overpowering that ſcent by others of a ſtronger nature. In order to this, the feet are to be covered with cloths rubbed over with aſſa fœtida, or other ſtrong ſmelling ſubſtances; and even oil of rhodium is ſometimes uſed for this purpoſe, but ſparingly on account of its dearneſs, tho' it has a very alluring, as well as diſguiſing effect, as will be obſerved below. If this caution of avoiding the ſcent of the opperators feet, near the track, and in the place where the rats are propoſed to be collected, be not properly obſerved, it will very much obſtruct the ſucceſs of the attempt to take them; for they are very ſhy of coming where the ſcent of human feet lies very freſh, and intimates, to their ſagacious inſtinct, the preſence of human creatures, whom they naturally dread. To the above-mentioned means of allwring by trailing, way-baiting, and calling, is added another of very material efficacy, which is, the uſe of oil of rhodium, which, like the marum ſyriacum in the caſe of cats, has a very extraordinary faſcinating power on theſe animals. This oil is extremely dear, and therefore ſparingly uſed. It is exhaled in a ſmall quantity in the place, and at the entrance of it, where the rats are intended to be taken, particularly at the time when they are to be laſt brought together, in order to their deſtruction; and it is uſed alſo, by ſmearing it on the ſurface of ſome of the implements uſed in taking them by the method below deſcribed: and the effect it has in taking off their caution and dread, by the delight they appear to have in it, is very extraordinary.

It is uſual, likewiſe, for the operator to diſguiſe his figure as well as ſcent; which is done by putting on a ſort of gown or cloak, of one colour, that hides the natural form, and makes him appear like a poſt, or ſuch inanimate thing; which habit muſt likewiſe be ſcented as above, to overpower the ſmell of his perſon: and beſides this, he is to avoid all motion, till he has ſecured his point of having all the rats in his power.

When the rats are thus enticed and collected, where time is afforded, and the whole in any houſe and outbuildings are intended to be clared away, they are ſuffered to regale on what they moſt like, which is ready prepared for them, and then to go away quietly for two or three nights; by which means thoſe, which are not allured the firſt night, are brought afterwards, either by their fellows, or the effects of the trailing, &c. and will not fail to come duly again, if they are not diſturbed or moleſted. But many of the rat-catchers make ſhorter work, and content themſelves with what can be brought together in one night or two; but this is never effectual, unleſs where the building is ſmall and entire, and the rats but few in number.

The means of taking them, when they are brought together, are various. Some entice them into a very large bag, the mouth of which is ſufficiently capacious to cover nearly the whole floor of the place where they are collected; which is done by ſmearing ſome veſſel, placed in the middle of the bag, with oil of rhodium, and laying in the bag baits of food. This bag, which before lay flat on the ground with the mouth ſpread open, is to be ſuddenly cloſed when the rats are all in it. Others drive, or fright them, by ſlight noiſes or motions, into a bag of a long form, the mouth of which, after all the rats are come in,

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is drawn up to the opening of the place by which they entered, all other ways of retreat being ſecured. Others, again, intoxicate or poiſon them, by mixing with the repaſt prepared for them, the coculus Indicus, or the nux vomica. A receipt for this purpoſe has appeared, which directed four ounces of the coculus Indicus, with twelve ounces of oatmeal, and two ounces of treacle or honey, made up into a moiſt paſte with ſtrong beer; but if the nux vomica be uſed, a much leſs proportion will ſerve than is here given of the coculus. Any ſimilar compoſition of theſe drugs, with that kind of food the rats are moſt fond of, and which has a ſtrong flavour, to hide that of the drugs, will equally well anſwer the end. If, indeed, the coculus Indicus be well powdered, and infuſed in the ſtrong beer for ſome time, at leaſt half the quantity here directed will ſerve as well as the quantity before mentioned. When the rats appear to be thoroughly intoxicated with the coculus, or ſick with the nux vomica, they may be taken with the hand, and put into a bag or cage the door of the place being firſt drawn to, leſt thoſe which have ſtrength and ſenſe remaining eſcape.

By theſe methods, well conducted, a very conſiderable part of the rats in any farm, or other houſe, and the contiguous buildings, may be taken. *Muſeum Ruſticum, vol.* I. *page* 395.

RAT-TAILS, excreſcences which creep from the paſtern to the middle of the ſhanks of a horſe, and are ſo called from the reſemblance they bear to the tail of a rat. Some are moiſt, others dry; the former may be treated with drying ointment and waſhes, the latter with mercurial ointment. If the hardneſs does not ſubmit to the laſt medicine, it ſhould be pared off with a knife, and dreſſed with turpentine, tar, and honey, to which verdigreaſe or white vitriol may occaſionally be added; but before the uſe of the knife you may apply this ointment.

Take black ſoap, four ounces, quick-lime, two ounces, vinegar enough to make an ointment. *Bartlet's Farriery, page* 296.

RED-CLOVER. *See the article* CLOVER.

RED-GAME, an Engliſh name of a bird, common in the mountainous parts of Yorkſhire, and ſome other of our northern counties. It is of the ſhape of a partridge, but much larger, and of a mixed colour of red and black, and is feathered down to the ends of the toes.

RED-LAND, a term much uſed by huſbandmen to expreſs a ſandy ſoil of a reddiſh hue, interſperſed for the moſt part with pieces of ſand-ſtone of the ſame colour, or ſomewhat deeper.

There are ſeveral varieties of this ſoil, one of which is almoſt entirely made up of ſand; another with an admixture of clay with the ſand, the whole making a looſe loamy earth; and a third, full of fragments, of a poor ſandy iron ore, and often containing ſhining ſpecks of ſelenitæ. *Moreton's Northamptonſhire.*

RED-WORM, the name of an inſect very deſtructive to young corn.

"I have often (ſays Mr. Baker, in his report to the Dublin Society) heard of the havock which red-worms make in young wheat, barley, and oats; and in ſome few writers upon huſbandry have read of them: but never ſaw them till May 1764; when to my great mortification, a few days, they deſtroyed, almoſt totally, nine acres of wheat, for I did not reap above half a barrel per acre. This misfortune induced me to propoſe to the conſideration of the Dublin Society, whether the offer of a premium might not probably produce a diſcovery of ſome effectual method for deſtroying ſo injurious an inſect, to the infinite advantage of the public: and the ſociety were pleaſed to offer a premium accordingly.

"I have now the honour to lay before them, what has occured to me upon that ſubject.

"The moſt ingenious M. de Chateauvieux ſpeaks of an inſect, which is certainly of the ſame kind, if it be not the very inſect which I have now under conſideration. This gentleman, after ſaying, "our wheat, in the month of May, 1755, ſuſtained a loſs, which even that cultivated according to the New Huſbandry did not eſcape, deſcribes the worm thus: we found in it many little white worms, which afterwards became of a cheſtnut colour. They poſt themſelves between the blades, and eat the ſtems. They are uſually found between the firſt joint and the roots; every ſtalk, which they attacked, grew no more, but became yellow, and withered. The ſame misfortune happened to us in the year 1732. The inſects appeared about the middle of May, and made ſuch havock, that the crops were almoſt deſtroyed."

"It perhaps might be expected, that this great man ſhould have made the very enquiry which we are now upon, as the loſs appears to have been very great in Geneva, at the two periods which he mentions: but when we conſider, how much the high office which he held in the city and republic of Geneva, muſt have engaged his attention, it is rather aſtoniſhing, that he could oblige the world ſo much as he hath done, by his repeated experiments in huſbandry, and his judicious obſervations upon them: it is therefore leſs to be wondered at, that this circumſtance eſcaped him.

"The ingenious Mr. Benjamin Stillingfleet alſo, in the ſecond edition of his Miſcellaneous Tracts, in a note, page 175-6, ſpeaks of an inſect, which is probably the ſame as that which we are ſeeking to deſtroy. His words are,

"Thus in Suffolk, and in ſome parts of Norfolk, the farmers find it their intereſt to encourage the breed of rooks, as the only means to free their grounds from the grub, from which the tree or blind-beetle comes, and which in its grub ſtate deſtroys the roots of corn and graſs, to ſuch a degree, that I myſelf have ſeen a piece of paſture-land, where you might turn up the turf with your feet.

"Mr. Matthews, a very obſerving and excellent farmer, of Wargrove in Berkſhire, told me, that the rooks one year, whilſt his men were hoeing a turnip field, ſate down in part of it, where they were not at work, and that the crop was very fine in that part, whereas in the other part there were no turnips that year.

"We ſee, that M. de Chateauvieux deſcribes this worm as being firſt white, and afterwards becoming of a cheſtnut colour I have carefully ſought them at different periods during the paſt year, but always found them of the ſame cheſtnut colour, never varying in any particular, except that of ſize, which I find to be the caſe at all ſeaſons, in which I have ſeen them.

"The inſect which Mr. Stillingfleet ſpeaks of, he calls a grub, which, he ſays, deſtroys corn and graſs: this induces me to believe, that it is the ſame inſect (though the report which he relates from Mr. Matthews ſeems to contradict it) becauſe I have obſerved, that the red

red or cheſtnut worm, never appears voluntarily upon the ſurface; but when the earth is turned up, either with plough or ſpade, the rooks and crows are very bold in their approach to pick them up; a circumſtance, which I own has in ſome degree abated my enmity to theſe birds: I therefore never deſtroy nor frighten them off my land whilſt I am ploughing it; but when I ſow, when the corn riſes, and when it is ripe, I deſtroy or baniſh them as well as I can, becauſe the miſchief which they do at thoſe times is intolerable.

A member of the Dublin Society informed me laſt ſummer that ſome of his turnips were deſtroyed by a worm; I had ſome few which decayed in their leaves, and became of a lemon colour, preceding the putrefaction which followed, and deſtroyed the turnips; I examined their roots, but could not diſcover any inſect which had injured them, and therefore I cannot pronounce that it is the red-worm which deſtroyed this gentleman's turnips; but I ſhall be very watchful with reſpect to this circumſtance, upon every opportunity which may preſent itſelf.

"I have obſerved my lucerne to decay in its tops, ſoon after it has been up; and upon examining the roots, I have found the red worm, which had cut them off.

This inſect ſeems to be every where in Ireland called the red-worm; by ſome of the Engliſh writers who have ſpoken of an inſect, which deſtroys the corn in the manner already mentioned; which I think is undoubtedly the ſame: it is called a grub, by others the large maggot, and the rook-worm, becauſe the rooks eat it; but as none of the writers have given any other deſcription of it than the name by which they reſpectively call it, I ſhall endeavour to deſcribe it.

"Red-worms are about half an inch long, and about one tenth of an inch in diameter; they are jointed in their ſkins, and are of a very firm texture: they have many ſhort legs, two ſmall black ſpecks, which appear to be their eyes; and two ſmall points ſpringing from their heads, with which I believe they cut the corn, and which, in that work, I apprehend, act like forceps: and all that I have ſeen of this ſpecies, are of a bright cheſtnut colour. For this reaſon, I ſhould conceive it would be more deſcriptive to call them the cheſtnut worms.

"When they are expoſed to the air, by turning up the earth which is infeſted with them, they will very ſoon cover themſelves again in the ſoil, which they are very capale of doing by the ſtrength which their make gives them, although they appear to be a ſluggiſh inſect, and have not the advantage of a ſlimineſs upon their ſkins, which the common large creeping worm has, which enables that inoffenſive worm to penetrate the earth, and get under timber and ſtones with eaſe.

"The red-worm, immediately endeavouring to cover itſelf from the air, is certainly from natural inſtinct, as it will ſoon die, when expoſed to the air; as will appear by the experiment, Numb. 10, hereafter mentioned.

"Theſe worms deſtroy wheat, barley, oats, and lucern, while in an infant ſtate, in the months of March, April, and May. Late-ſown barley and oats, they will deſtroy as late as June. I have not yet experienced, that they deſtroy any other crops.

"The miſchief done by them is in dry weather. Rain ſufficient to penetrate the ground, makes them deſiſt from deſtroying the corn; and, I ſuppoſe, every thing elſe which they at any time injure.

"They cut wheat off, juſt above the crown of the roots; barley and oats in the ſame place, and alſo higher up, upon any part of the ſtem, which is below the ſurface of the earth.

"Theſe worms ſeem to abound more in ground which is lightly tilled, than in ſuch as hath been well tilled; but, in lay ground, they ſeem to be more numerous than any where elſe: and the fields upon my farm, in which I have found them, are wetter than other fields where they are not; whether that circumſtance contributes to their increaſe, I cannot ſay; but the following experiments prove, that they will live longer in water than they can when expoſed to the open air.

"*Experiments on Red-worms.*

"Numb. 1. I put ten red-worms into a wine-glaſs with common ſalt in it. They were all dead in four hours.

"Numb. 2. Into a glaſs with brine in it I put ten red-worms. They were all dead in ſix hours.

"Numb. 3. Into a glaſs with lime in it, which had been ſlaked for a long time, and expoſed to the weather, I put the like number. They were all dead in forty-four hours.

"Numb. 4. Into a glaſs with the above lime, and ſome water in it, I put the like number. They were dead in twenty hours.

"Numb. 5. Into a glaſs with lime newly ſlaked, and when cold, I put the like number. They were dead in fourteen hours.

"Numb. 6. Into lime-water, made with cold water, I put the like number. They were dead in ten hours.

"Numb. 7. Into a glaſs with ſoot in it, I put the like number. They were dead in four hours.

"Numb. 8. Into ſoot and water, I put the like number. They were dead in four hours.

"Numb. 9. Into fair water, I put the like number. They were dead in fifty-two hours.

"Numb. 10. Into a glaſs, without any thing in it, I put the like number. They were dead in thirty-two hours.

"By theſe experiments we ſee all the articles uſed will kill this inſect in a ſhort time, particularly the ſalt and ſoot. I thought it neceſſary to conſider different articles, the better to ſuit different parts of the kingdom.

"Where lime can be conveniently had, and that it is uſed as a manure, I am apt to believe, from the experiments, that no injury can be ſuſtained from theſe worms; but I am afraid a ſmall quantity will not effectually deſtroy them; beſides, I ſhould fear, if it were not put on before the ſowing of the corn, that it might ſinge the blades of the corn; for, from theſe experiments, it appears, that lime newly ſlaked, is more ſuddenly deſtructive to them than old lime, and therefore it is to be preferred.

"Where lime is uſed for no other purpoſe than to deſtroy this worm, I ſhould conceive, that about eight barrels, regularly ſown by hand on an acre of ground, might be ſufficient: it muſt be firſt ſlaked and cold before a man can poſſibly caſt it upon the ground with his

hand,

hand, lime being a very ſtrong cauſtic; and, even when it is cold, the man ſhould have a thick glove upon his hand.

"Where ſalt ſhall be uſed to deſtroy this worm, it muſt always be ſown upon the ground, before the intended crop; for, although corn will vegetate, and receive benefit from ſalt as a manure, when it is uſed antecedent to the ſowing the corn, yet, if it be added after the corn is growing, it will certainly deſtroy it: and therefore, it ſhould never be uſed for this purpoſe, but before the corn is ſown, or at leaſt before it vegetates.

"I conceive that where ſalt is uſed for this purpoſe only, about four hundred and a half to an acre will anſwer the purpoſe, which is a trifle more than one ounce to every ſquare yard.

"We ſee by the experiment, that ſoot kills this worm as ſoon as ſalt; and as in moſt places it is to be had at a much leſs price than ſalt, I think there can be no doubt about preferring of it; beſides which, it may be ſafely uſed after the corn is up.

"I had ſome ſmall parcels of barley under experiments, which theſe worms began to deſtroy; and in order to convey the ſoot as ſoon as poſſible to the roots of the plants, I mixed a little of it in water, and poured it on the plants with a garden watering-pot: the conſequence was, that I did not loſe one plant afterwards.

"It will hardly be imagined, that I mean that the ſame method is to be purſued upon a whole farm: no; the method I would recommend to the practice of the farmer is this, to ſpread or caſt by hand, as he ſows his corn, about ſix or eight barrels of ſoot on an acre, and let him be careful to chooſe a calm day for the work, otherwiſe the wind will carry away great part of it: and as what remains cannot be regularly diſpoſed, let him be careful to do it early enough in the ſpring, that the rain may waſh in the ſoot and convey it to the roots of the plants before the worm begins the miſchief; if he does this, I am perſuaded his crop will be preſerved.

"We ſee by the experiments, that this worm will live longer in water, by twenty hours, than when expoſed to the open air; but at length, i. e. in fifty-two hours, they died in the water; perhaps this might be from the effect of drowning; but if ſo, I might have expected they would have been totally deſtroyed in my two fields in the winter of 1763 and 1764, by the immoderate rains which fell at that ſeaſon for a long continuance, by which the land was often flooded. But they ſurvived that winter, as appeared by the great loſs I afterwards ſuſtained, by their deſtroying my wheat; and therefore, whether water be an enemy to them or not, it ſeems not eaſy to determine: but if theſe which died in the glaſs of water were really drowned; yet, I think we may conclude, that water is neceſſary to their exiſtence in the earth, and probably aids them in getting their food from it: and what ſeems to confirm this notion is, that when the land is wet, they do not touch the corn, but as ſoon as ever the land is dry, they begin their miſchief. However, this ſpeculation I muſt ſubmit to the conſideration of perſons more capable of diſcuſſing it than I am.

"We ſee by the experiment, Numb. 10, that they cannot live in the open air; which ſeems to prove, that, where they abound in land, the oftener it is ploughed, particularly in the ſummer, when they cannot penetrate the ground ſo eaſily as when it is moiſt, they muſt be, by ſuch ploughing, greatly diminiſhed; beſides which, the frequent ploughing gives the crows more opportunities of picking them up, in which, as I before ſaid, they are very watchful.

"Frequent ploughing has been recommended by ſome writers as the only means of deſtroying this worm; and they have recommended the ploughs being ſtuck with nails, urging, that by thoſe nails the worms are cut to pieces; others have recommended walnut leaves being ſoaked in water, to ſprinkle the land; and ſteeping ſeed-corn in various liquors, as infallible remedies: but ſuch methods as theſe are founded upon miſtaken principles; they only miſlead the farmer, and muſt diſappoint him.

"Worlidge recommends a ſtrong lye made of fixed ſalts, but that would be impracticable. Mortimer recommends ſea-water, for ſuch lands as are near the ſea-coaſt, which I believe would anſwer very well. He ſays he uſed ſoot once with ſucceſs, but that it did not ſucceed with him afterwards. I am perſuaded he did not uſe the ſoot early enough to have it waſhed into the ground by rain, or perhaps he uſed too ſmall a quantity.

"I would not be thought to arrogate any merit to myſelf, on account of what I have here offered on this ſubject, ſince it appears that other perſons have uſed the articles which I have recommended, againſt this common enemy; but many perſons have been diſappinted in their expectations from theſe remedies, which muſt have ariſen from their either having uſed too ſmall a quantity, or not having obſerved the neceſſary precautions; if thoſe which I have recommended, ſhall be put in practice, and found to anſwer, I ſhall think myſelf amply rewarded."

REED, the name of an acquatic plant, infeſting low paſture-lands.

The beſt method of deſtroying reeds, is by draining the land; for if the drains be cut deeper than their roots, it will take away their nouriſhment, and, conſequently, deſtroy them. Aſhes, or ſoot, will likewiſe kill them; and ſo will ploughing up the land, and laying it in high ridges. They always indicate a good ſoil, for a bad one will not nouriſh them.

REEK-STAVEL, *or* REEK-STAFFOLD, a frame of wood placed on ſtones, on which the mow or ſtack is raiſed.

REEK. *See the article* STACK.

REY-*graſs*, a hardy ſort of graſs, much eſteemed among the farmers for that quality. It will grow on any land, and therefore produces crops where nothing elſe will. It thrives beſt of all on ſour, clayey, and weeping grounds, and equally endures the ſevereſt droughts of ſummer, and froſts of winter, ſuffering no damage from either. It is the beſt of all winter foods for cattle, the ſhorter it is eaten the better, and it ſprings the earlieſt of any. There is no danger of overſtocking it, for, if it be left to grow too much, the ſtalk becomes hard and ſticky. It is beſt for horſes and for ſheep, and very much prevents the rotting of the latter. The beſt way of ſowing it is with clover. The common quantity of ſeed is two buſhels to an acre, but three buſhels is much better; though in ſome lands, where the clover is likely to ſucceed very well, they ſow eight pounds of clover ſeed and one buſhel of rey ſeed to an acre, and this makes a crop that will laſt ſeven or eight years.

Some mow it as hay, and thraſh it for the ſeed, which, about London, ſells from half-a crown a buſhel to three ſhillings. Four or five quarters of this ſeed will be ſometimes produced from an acre of the graſs. If at any

any time a field of this graſs is found to grow thin, it is only neceſſary to ſtrew on a buſhel of this ſeed, and roll it with a wooden roller, and the plants riſing from this addition will make the whole crop ſufficiently thick. Rey graſs has this great advantage, that it kills weeds without any other ſown plant: even thiſtles cannot grow among it. When the rey-graſs is cut for hay before perfectly ripe, the hay is the better; but the ſeed will not grow ſo well. When the ſeed is newly thraſhed, it muſt not be laid too thick, for it is very apt to heat and ferment, and the whole will be ſpoiled. *Mortimer's Huſbandry, vol I. page* 60.

RICE, the name of a plant cultivated in many parts of the Eaſt, in South Carolina, and alſo in Spain, Italy, and Piedmont.

The plant grows to the height of about two feet and a half, with a ſtalk not unlike that of wheat, but fuller of joints, and with leaves reſembling thoſe of a leek. It branches out into ſeveral ſtems, at the top of which the grains grow in cluſters, and each of them is terminated with an arum or beard, and incloſed in a yellow rough huſk. When ſtripped of this they appear to be of an oval ſhape, of a ſhining white colour, and almoſt tranſparent.

The following account of the culture of rice in China, is taken from M. Duhamel's Huſbandry.

"1. To haſten the ſprouting of the rice, it is put into baſkets, and ſoaked for ſome days in a ſtanding water.

"When their rice grounds are ſo ſoaked with water as to be quite like mud, they ploughed them with a buffalo yoked to a plough very ſimple in its make, having but one ſhare, one handle, and no wheels.

"3. After a gentle rain, they break the clods with a kind of large hurdle, drawn by a buffalo; the driver ſitting upon it, to increaſe the weight.

"4. The ground is cleared of all ſtones, and whatever roots are in it are pulled up by a ſtrong harrow with great iron teeth. This inſtrument is drawn by a buffalo, and a man guides it with the help of two handles, like thoſe of a plough, upon which he leans hard. The earth is like mud, and partly covered with water during all this operation.

"5. The earth is afterwards ſmoothed with a harrow, which has ſeveral rows of teeth. A man guides this harrow by its two handles, whilſt a buffalo draws it; and as faſt as its teeth form little channels in the ground, the water runs in, and fills them up.

"6. When the rice that was laid to ſoak has ſprouted, the ſeed is known to be good; and it is then ſown by hand, very thick, and as equally as poſſible. Only part of the ground is ſown in this manner, to furniſh plants for the reſt.

"The day after it has been ſown the points of the plants appear above the ſurface of the water: for the ground is overflowed all this time with juſt enough water to cover it.

"7. When the plants have acquired a little ſtrength, they are ſprinkled with lime-water, to deſtroy the inſects and ſome of the weeds that would hurt them. For this purpoſe a ſmall baſket is faſtened to the end of a long handle, and dipt in the lime water, which runs through it, and is conveyed over the plants.

"The Chineſe have a great veneration for the firſt inventor of this method, which anſwers to our cuſtom of ſteeping wheat in lime-water, or manuring land with quick-lime.

"8. Towards April, when the plants are grown ſtrong enough to cover the whole field, and look very green and even, the greateſt part of them is pulled up by handfuls, all the mud is carefully waſhed off their roots, and, being held all this time as even as poſſible with one another, they are planted in tufts, pretty far aſunder, and in a quincunx form, in fields prepared on purpoſe for them. A ſerene day is choſen for this operation, which muſt be performed as quick as poſſible.

"This practice of the Chineſe is with reſpect to the common culture of rice, what the New Huſbandry is with reſpect to the common culture of wheat.

"9. The rice muſt be watered: which is always done in China, by overflowing it. To this end, the rice grounds are always near a rivulet, pond, or great pool of water, from which they are ſeparated only by a bank or cauſey.

"If the water was higher than the rice ground, a trench cut through the cauſey would overflow it at once: but as it is generally lower, or on a level with the rice ground, the neceſſary quantity is conveyed in pails or buckets, which are worked chiefly by the help of ropes.

"10. Though a man cannot ſtep in theſe rice grounds without being up to his knees, the Chineſe weed them three times in a ſummer; and that with ſuch care, that they pull up even the roots of every weed.

"11. When the rice is ripe, which is known by its turning yellow like wheat, it is cut down with a ſickle, made into ſheaves, and carried to a barn, where it is threſhed with flails pretty much like ours: the ſtraw is removed with pitch-forks and ſhovels, and the outer huſk of the grain is taken off by beating it with great wooden peſtles, or a kind of mallet, after which it is ſifted and winnowed: and, laſtly, to get off the under huſk, the grain is put between two-mill-ſtones, which are worked by a lever faſtened to the upper one.

"The two moſt remarkable circumſtances of this culture are, 1. The care which the Chineſe take not to let their plants be too cloſe together, leſt they ſhould rob one another of their food. 2. Their weeding their rice grounds three times in a ſummer, which anſwers the end of the hoeings recommended for the alleys between the beds of other grain, cultivated according to the New Huſbandry. *Culture de Terres, Tom* II. *p.* 180.

RICK, a pile of corn, hay, ſtraw, &c. regularly heaped up in the open air, and ſheltered from wet. *See* STACK.

A practical farmer has given the following account of the benefits ariſing to the farmer from keeping his wheat-ſtraw in ricks, to be uſed when occaſion requires it.

"Experience will, they ſay, make a fool wiſe: I took the hint, and have ever ſince guarded againſt a misfortune of the like nature.

"I conſtantly, ſays he, every year make a rick of wheat-ſtraw, unleſs it happens to be very ſhort, when I keep my rick two years, inſtead of making a new one the ſecond year.

"This may, and doubtleſs will, by ſome of your readers be thought an unneceſſary expence; yet as I find it anſwer, I am determined to continue the practice. I not only rick the ſtraw, but I alſo ſlightly thatch the rick to keep out the weather; yet, after all, I ſave by it.

"As I keep a very regular account of my farming ex-

pences,

pences, I find that in the ſpace of ten years I am a gainer of fifty-three pounds, by ſaving in this manner a rick of ſtraw for thatching, beſides what I ſaved by not threſhing my wheat at an improper ſeaſon. When I ſay I am a gainer of ſo much money in the time, I mean a clear gain: after deducting the expences of making up the rick, thatching it, &c. my expences in thatching for the laſt ten years have been fifty-three pounds leſs than they were the ten preceding years; and this I can eaſily account for, and will, for the ſatisfaction of your readers, at leaſt in part, do it.

"I now always do my thatching work at the moſt convenient ſeaſon, being never in want of ſtraw; and, for the ſame reaſon, as ſoon as any part of my thatching is deficient, I have it immediately repaired, which is a great ſaving.

"My thatching now laſts longer that it uſed to do, for I never thatch with ſhort ſtraw, having always, as I obſerved before, long ſtraw to uſe; for in the years when the ſtraw is long, I ſave the largeſt rick, which I have ſometimes kept two or three years, till the wheat ſtraw has been long again.

"In the ſpace of the laſt ten years I had two accidents happened, which would have proved very expenſive to me, if I could not have reſorted to my ſtraw rick.

"The firſt was, that one of my ſons (a boy about ten years of age at the time) ſet fire to the thatch of a large barn by means of a ſquib. It burnt furiouſly for ſome time, and ſo far damaged the roof, that I was obliged to have it new thatched; for which purpoſe I made uſe of a part of my ſtraw rick, and it was finiſhed in a few days; whereas, if I had not had this rick, I muſt have bought ſhort ſtraw, for there was ſcarcely any other to be had, at a large price, and the thatching could not have been finiſhed ſo ſoon; by which means I ſhould have had a conſiderable quantity of barley, that was in the barn, damaged, for it rained very hard for a conſiderable time, in a few days after the thatch was repaired.

"The other accident was occaſioned by a guſt of wind which ſtripped off a good deal of thatch; but it was ſoon repaired, without any damage to the corn that was in the barns at the time.

"All this, perhaps, may not be enough to perſuade your practical readers to rick their long ſtraw. If this is the caſe, they muſt even continue their old practices: yet I hope I may be permitted to ſay one thing, which I know to be true; what I mean is this, that farmers, if they would attend to matters which they generally think beneath their conſideration, would get more money than they do: profits ariſe from what appear to be trifles at firſt ſight, and the mereſt triſle ſhould be by a farmer attended to.

"A habit of induſtry, frugality, œconomy, and perſeverance, is abſolutely neceſſary to the occupier of land, if he does not mean ſoon to ſhift his quarters." *Muſeum Ruſticum, vol.* III. *p.* 245.

RIDDLE, an oblong ſort of ſieve uſed to ſeparate duſt, and the ſeeds of plants from corn.

RIDE, a cluſter of ſprigs of hazel, or the underwood, ſhooting out of the ſame root.

RIDGE, a long piece of riſing land between two furrows.

Mr. Tull obſerves, that the method of ploughing lands up into ridges is a particular kind of tillage, the chief uſe of which is the alteration it makes in the degree of heat and moiſture. But the principal advantage this gentleman propoſes from ridges is the draining wet hills, where the upper ſtratum is mould, and the ſecond ſtratum clay. Theſe ridges he obſerves ſhould be ploughed acroſs the hill almoſt horizontally, that their parting furrows lying open, may each ſerve as a drain to the ridge next below it; for when the plough has made the bottom of theſe horizontal furrows a few inches deeper than the ſurface of the clay, the water will run to their ends very ſecurely, without riſing into the mould, provided no part of the furrows be lower than their ends. Theſe ridges and their parting furrows muſt be made more or leſs oblique, according to the form and declivity of the hill; but the more horizontal they are, the ſooner the rain water will run off the lands: for in that caſe, it will run to the furrows, and reach them at right angles. Every one of theſe horizontal trenches receives all the water from the rills, or little gutters, which in theſe quagmire-hills run betwixt the mould and the clay; theſe are all cut off by the trenches, which receive their water at the upper ſides, and carry it away, as the gutters of lead, placed under the eaves of a houſe, carry away the rain water. Theſe ridges ſhould be ploughed in pairs, without throwing any earth into the trenches; and at every time of ploughing, the pairs muſt be changed, ſo that the furrow which had two ridges turned towards it one time, muſt have two turned from it the next. *See the article* PLOUGHING.

RIDGES, *in a Horſe's Mouth*, are wrinkles or riſings of fleſh in the roof of the mouth, running acroſs from one ſide of the jaw to the other, with furrows between them.

RIDGELING, the male of any beaſt that has been half caſtrated.

RING-BONE, a hard ſwelling on the lower part of the paſtern of a horſe, and generally reaches half round the fore-part. It has its name from the reſemblance to a ring.

It often ariſes from ſtrains, &c. and when behind, from putting young horſes too early upon their haunches; for in that attitude a horſe throws his whole weight as much, if not more, upon his paſterns, than on his hocks.

When it appears diſtinctly round the paſtern, and does not run downwards toward the coronet, ſo as to affect the coffin-joint, it is eaſily cured; but if it takes its origin from ſome ſtrain or defect in the joint originally, or if a callofity is found under the round ligament that covers that joint, the cure is generally dubious, and ſometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horſes, will often inſenſibly wear off of themſelves, without the help of any application; but when the ſubſtance remains, there needs no other remedy beſides bliſtering, unleſs when by long continuance it is grown to an obſtinate hardneſs, and then it may require both bliſtering and firing.

To fire a ring-bone ſucceſsfully, let the operation be performed with a thinner inſtrument than the common one, and let the lines or razes be made not above a quarter of an inch diſtant, croſſing them obliquely, ſomewhat like a chain; apply a mild bliſter over all, and when quite dried up, the rupture plaiſter; and then turn the horſe to graſs for ſome time. *Bartlet's Farriery, p.* 264.

RIPPLING *of Flax*, the operation of taking off the ſeed from the flax by drawing it through a ripple or large comb. *See the article* FLAX.

RISING, yeaſt, or barm.

RIVER, a current, or ſtream of freſh water flowing in a bed or channel, from its ſource into the ſea.

RIVULET, a little river or ſmall ſtream of water.

ROD, a meaſure in length, conſiſting of ſixteen feet and a half.

ROLLER, a large piece of wood turning on its axis, and drawn over the ſurface of the ground to break the ſmall clods, and render it ſmooth and even.

Spiky ROLLER. *See* SPIKY ROLLER.

ROLLING, the operation of drawing a roller over the ſurface of the ground

"Rolling, as well as ploughing and harrowing, ſays Mr. Clarke, if admitted in the culture of fallow lands, would, I preſume, much facilitate eradicating of weeds, and promote the prolific capacity; for it often happens, that after land has been ploughed and worked with the great harrow, &c. there ſtill are graſs and weeds remaining, that will the next ploughing cauſe the furrows to be ropy, and then much labour and time is required to make it to the mind of the judicious huſbandman, which rolling it in the following order will be found to elude.

"Thus, when the land has been once ploughed, bracked, and harrowed, immediately give it a double rolling with a ſtone cylinder about four feet long and three feet radius, which, with its furniture, is a roller about one ton weight: the preſſure of ſuch roller, when there is little moiſture in the land, fixes it ſo much, that no weeds nor graſs can vegetate; next, in about a month after, put in manure by another ploughing, viz. dung or compoſt, whereof dung is the major part; but lime is at this time very improper, as it reſiſts putrefaction: then give the land a ſtroke with the great harrow, and roll it as before: this puts the manure, ſoil, and juices in contact; by which, together with the vivifying heat of the ſun, (that muſt be greater on rolled land than on looſe, rough, unſteady particles of earth, becauſe it thereby becomes quieſcent, and the ſurface acquires a kind of poliſh) fermentation and putrefaction muſt be ardently excited.

"That theſe are ſalubrious and moſt powerful agents in the fertilizing of land, by looſening the compaſſes, and ſetting at liberty the more ſubtile parts of the manure and ſoil, and generating that ſort of air which is found ſo neceſſary to animal as well as vegetable life, none converſant in theſe matters can make the leaſt doubt.

"Now, indeed, may a quantity of quick-lime be applied to great advantage, by being ſpread on the ſurface; for the weeds that are harrowed up, will not only ſoon be diſſolved by it, and converted into nouriſhment for vegetables, but the very principle of vegetation, which is going off in exhalations by the effervеſcence within, is by it abſorbed, and retained for the nutrition of the crop, which it will communicate when it is ploughed in; and that may be done about fourteen or twenty days after, ſooner or later, as the weather anſwers, or the experimentor ſees it neceſſary: and if it is a ſoil fit to grow turneps, and the ſeaſon proper, the ſeed may be ſown immediately, either in the drill or common way; but the drill, on many accounts, in ſowing turneps, deſerves precedency; or, if it is to be winter corn, one ploughing more, which is the third only, makes it in fine order for the ſeed.

"The utility of rolling does not end here neither; for to roll wheat, rye, barley, &c. with a roller about twice the length, and half the weight of the one above deſcribed, may be advantageous, as it preſſes down the ſoil, that has been raiſed by the froſts, about the minute ramification of the attracting ducts, and augments the quantity of mould upon them, by breaking the little lumps of ſoil which, indeed, were very ſerviceable in winter, by affording ſhelter, but in ſpring will ſtill be of greater uſe, by ſuch imminution, in filling up the fiſſures, and preventing, in a great meaſure, the ill effects droughts have on light ſoils, by retaining and filtering rain water; whereby the ſoil imbibes whatever is nutritive, what is ſuperfluous of the ſimple fluid only eſcapes.

"Theſe are ſome of the many advantages rolling produces in agriculture; notwithſtanding which, it amounts to more than mere conjecture, that in general rolling corn may do more damage than it can do good, if ſuch as the following cautions be not carefully attended to, viz. Never to roll corn but in dry, freſh weather; by no means uſe heavy rollers, nor roll to early, i. e. before the blades be pretty ſtrong, for the wounds that the blades may receive, the roots, being then tender, will be unable ever to recover; nor too late, i. e. when the ſtalks are hardened and grown to any height, for the roller will break them, which injury hardly can be repaired, and the crop is thereby hurt; that none but light lands are proper to be rolled, and thoſe only which have been manured that or the preceding year with dung: in ſhort none but rich, light ſoils, in general, can be improved by rolling: for in poor lands it oppoſes the moſt active primogeneous agents, and undoes all that has been done for the crop by ploughing, &c.

"Thus the ſoil, the condition, the growth of the corn, the weather, and the weight of the roller, are all to be moſt ſcrupulouſly regarded: when all coincide, the advantages of rolling will be great; but when they do not, the diſadvantages may be inſuperable.

"Rolling, then, is neither the leaſt critical, nor moſt inſignificant piece of the huſbandman's profeſſion; therefore ought not to be performed at random and without circumſpection. *Muſeum Ruſticum, vol.* IV. *p.* 5.

Rolling is alſo of uſe to land in graſs, by preſſing down mole-hills, &c. It alſo makes the graſs tiller, and grow thicker.

There is a ſort of land, which, when clover is ſown upon it, throws out the young plants after a froſt. Rolling in the beginning of winter, and immediately after the froſt is gone, will, in ſome meaſure, prevent this. The firſt rolling hinders the froſt from penetrating ſo deep as it would otherwiſe do; and the ſecond makes the land firm, after having been looſened by the change from froſt to open weather.

ROOD, a quantity of land equal to forty ſquare poles or perches, that is, a quarter of an acre.

ROOK, a well-known bird, reſembling a crow; but feeds on grain, inſects, &c.

Great care ſhould be taken to guard againſt theſe miſchievous birds at the time when the wheat is juſt ſhooting up; for they perceive its ſhooting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt, therefore, be carefully kept off the ground about a week or ten days after this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble about ſtealing it. They never moleſt the wheat which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it much eaſier to pick up that, than to ſearch

for corn under-ground in new-ſown lands. They do moſt harm when the ſnow is firſt going off from the green wheat towards the end of winter; for having been pinched for food during that ſeaſon, they then greedily pluck up the young plants, in order to come at the remainder of the ſeeds ſtill adhering to their roots; and are greatly aſſiſted in this by the looſe ſtate of the earth at that time.

Among the many contrivances to frighten them away, ſuch as feathers ſtuck up, the limbs of rooks ſcattered about the ground, dead rooks hung on ſticks, the gun, a boy to halloo and throw his hat, or to toſs a dead rook up in the air, Mr. Tull ſays he found this laſt to be the moſt effectual. They will immediately quit their uſual places of abode, if the earth is turned up around the trees, in which they have built their neſts, and will not return to them till the graſs is grown again; as was lately experienced in the repairing of Fountain-court in the Temple: Mr. Liſle aſſures us, that the taking down of their neſts, with their young ones in them, and burning under the trees they were built in, will effectually make all the old ones deſert that place. However, it has been doubted, and perhaps with reaſon, whether they do not, upon the whole, compenſate pretty fully, for the miſchief they do to corn, by deſtroying vaſt quantities of grubs, worms, and other pernicious inſects, in the ſpring: as crows are alſo of ſervice in the neighbourhood of populous towns, by devouring a great deal of carrion.

It is a common proverbial ſaying of the countrymen, that at whatſoever farm a co'ony of rooks plant themſelves, and make a rookery, it is a ſign of proſperity to the occupier of that land; and that, on the contrary, their deſerting it, betides misfortunes and poverty: for both which remarks, Mr. Liſle accounts very rationally, by obſerving, that where a man is a good huſbandman to his land, and improves it, the worms, which are a great food to theſe creatures, eſpecially at certain times of the year, multiply, and grow to a much greater bulk and fatneſs, than in a poor neglected ſoil; the ſtrength of land being as diſcernable by the large ſize of worms, as from the growth of plants; and that the grubs or maggots of the beetle kind in particular, on which the rooks feed greatly, as is apparent from their following the plough, in order to pick them up, not only grow fatteſt and largeſt in rich well tilled ground; but that the beetles themſelves, while in their ſtate of flies, always chooſe to lay their eggs in ſuch land as will beſt nouriſh and provide for their young. The contrary to this ſoon happens under a bad huſbandman.

ROOKERY, a nurſery of rooks, or place where they build their neſts.

ROOP, hoarſeneſs.

ROOT, the lower part of a plant, by which it adheres to the earth, and by which it draws its nouriſhment, and tranſmits the juices to the other parts. For the method of clearing lands from the roots, *ſee the article* GRUBBING.

The roots of plants are of uſe to them principally in two reſpects, viz. to give the plants ſtability in the ground, that they may not be diſplaced, or blown down by high winds, or rather accidents. Another important uſe of roots, is their ſpreading in the ground, and from thence collecting food for the whole plant. Plants are in part fed or nouriſhed from the air, fine vapours, &c. that enter at their leaves and branches, but principally by what enters at their roots: for which reaſon the huſbandman takes infinite pains to prepare the land by tillage and manure, whereby it is opened, pulverized, and made eaſily penetrable for the roots to ſpread in it, and collect the aliment, or vegetable nouriſhment.

Roots may be divided into two ſorts, viz. perpendicular roots, which penetrate deep in the ground, and run down uſually ſingle and perpendicularly, as carrots, parſneps, the perpendicular roots of trees, &c. which are alſo called tap roots. Thoſe that divide near the ſurface of the ground, and ſpread in it, in various directions, are called horizontal roots, fibrous roots, and if very ſmall, capillary roots. The tap roots have alſo fibrous roots, iſſuing from their ſides, all round the tap root: and theſe lateral roots are longeſt near the ſurface of the ground, and gradually ſhorter as the tap roots deſcend deeper.

The ſurfaces of the roots are ſpongy and porous, particularly of the ſmall or fibrous roots, and at theſe pores the vegetable food enters, and is diſtributed to all parts of the plant. The large roots are cloſe, and have few pores on their ſurfaces; by which it appears, that they are chiefly intended for the ſupport and ſtability of the plant, and the fibrous roots for collecting the nouriſhment for the plant, and large roots.

The branches of roots are formed, with their extreme ends, pointing from the ſtem of the plant; and hence it appears, that roots once formed, do not afterwards encreaſe, or extend further longitudinally; they lengthen at their ends, but not at their intermediate parts: for if they did, the branches being left behind, would be drawn back, with their ends pointing towards the ſtem: but they are conſtantly found in a contrary poſition, with their ends pointing in a direction from the ſtem. If a root is cut, it extends no farther in length, as before obſerved, but new roots are formed near the cut end of the old root; two or more new or young roots are formed in the room of the former old one. Hence the fibrous roots of plants are multiplied by cutting them with a ſpade or hoe: and this is often a great benefit to the plant. The pores of the fibrous root are the mouths by which the whole plant is fed, and the more they are multiplied, the more nouriſhment they collect for it.

Thus a plant that naturally extends its roots to a conſiderable diſtance, is in danger of being killed by tranſplanting, unleſs it is alſo furniſhed with fibrous roots, which muſt be carried with it to the new ground; or new ones muſt be formed, to make the plant thrive. Hence it is, that plants, which have long ſtraggling roots are removed with difficulty; but plants of the ſame kind, and age, and that grow in the ſame ground, are tranſplanted with ſafety and ſucceſs, if they have been previouſly dug round with a ſpade, whereby their fibrous roots have been cut and multiplied, ſo that they riſe with a ball of earth adhering to them.

There is a communication between the roots of a plant, and when ſome of them are well nouriſhed, the others are benefited thereby. If ſome of the roots of a plant are laid in dry earth or ſand, and others in water, they will furniſh the dry roots with water ſufficient to keep them, and the earth about them, moiſt, ſo long as they have a ſupply of water: for this reaſon deep rooting plants are little affected by drought; the tap roots finding moiſture below, ſend up ſome of it to the roots near the

the ſurface: for which teaſon lucern and ſaintfoin flouriſh in ſuch dry hot weather, by which common graſs, and other fibrous rooted plants, that do not deſcend deep are ſcorched and burnt up.

As roots communicate moiſture to each other, they therewith communicate alſo nouriſhment: for it is found by experience, that drilled plants, well hoed, one ſide of a row only, are better nouriſhed than ſown plants, ſtanding at equal diſtances; or upon an equal ſurface of ground with the drilled, and not hoed.

The attentive farmer will diſcover many other particulars concerning roots: whereof the knowledge is uſeful in the common culture, and in hoeing neceſſary.

ROSIL, or *Roſills*, land neither light nor heavy, being a medium between ſand and clay.

ROT, a diſeaſe incident to ſheep, ariſing frequently from wet ſeaſons, and too moiſt paſture.

"But the rot in ſheep, ſays an ingenious and practical writer, does not always either proceed from moiſture alone, or the nature of the ſoil alone; for all moiſt grounds do not cauſe the rot in ſheep, and there are ſome lands which rot ſheep in wet years only.

"The rot, in fact, ariſes from a certain putrefaction, both in the air, and in the graſs or herbs that uſually grow in ſuch moiſt years: theſe, together with their moiſt food, corrupt their livers, and bring on the diſeaſe.

"It is indeed very difficult to cure this diſorder, unleſs it is attempted before the liver is too much waſted: where there is a convenience of doing it, the beſt remedy is, an immediate removal to ſalt marſhes; but this is far from being in every farmer's power: I ſhall endeavour therefore, from my own former experience, to ſupply the deficiency.

"In ſuch caſes as theſe, a prevention of the evil is to be recommended to the practice of every rational farmer.

"Some grounds naturally yield a ſoft, ſpungy graſs, which is, more than any other, ſubject to breed the rot in ſheep; I would therefore adviſe, that other cattle be fed in theſe grounds, and the ſheep kept in the drieſt, hardeſt, and healthieſt paſtures.

"I have known land that has kept ſheep in health for many ſucceſſive years, yet afterwards, when the months of May and June have proved wet, a frim and frothy graſs has ſuddenly ſprung up, which, together with the bad air that muſt of courſe follow, has cauſed a rot in the ſheep that were then on it; the evil was obſerved in time, the ſheep were removed to a dry and almoſt barren heath, and in the ſucceeding winter they were foddered with good, dry, ſweet hay, and a great loſs was prevented: this happened to an old friend of mine, ſince dead.

"This unwholeſome graſs is moſt apt to grow in cold land, and in the ſummer time; and it is a general opinion, and well founded on experience, that if the ſummer does not rot ſheep, the winter will not, the power of the winter alone not being ſtrong enough to begin a rot.

"A very ſenſible writer, whoſe book I have juſt turned to, I mean Mr. Liſle, ſays that broom is very good for the rot; and indeed I have often experienced it; for in a farm I occupied ſome years ago there were ſeveral broom-fields, and I have often obſerved that ſuch of my ſheep as were part of the year fed in them were never infected with the rot, whilſt others in my poſſeſſion had it to a great degree. I profited however by experience, for I took care thenceforward that all my ſheep ſhould, by turns, enjoy the advantages to be derived from their feeding on the young ſhoots of the broom.

"As to what Mr. Liſle ſays, on the authority of Mr. Ray, that the marſh-trefoil will cure the rot, I cannot from experience, corroborate it: I have heard its efficacy in this diſorder often mentioned, but never yet heard any particular fact related ſo circumſtantially as to induce me to depend on its effects.

"That ſalt is good, I agree with the above gentleman and Mr. Boyle; and this gives me an opportunity of communicating a receipt which I know to be a good one.

"When you perceive, by the colour of your ſheep's eyes, that the rot has taken them, drive your flock into a barn, a covered fold, or ſome ſuch convenient place: around this place let there be wooden troughs, like mangers, in which you ſhould feed your ſheep with good, dry, clean oats, for forty-eight hours: then have ready ſome bay ſalt finely powdered and ſearced, of which you are to ſprinkle a little among the oats, encreaſing the quantity till it diſguſts the ſheep, and you perceive they fall off their appetites: afterwards, for the two following days give them again clean oats; and then mix your ſalt with them as before, continuing this proceſs till their eyes have recovered their natural colour, when you will find them perfectly cured; and to be convinced, it will only be neceſſary to kill one or two of the flock.

"To this I ſhall add a receipt for the rot in ſheep, which was communicated to me by a friend, a man of credit and veracity, who ſays he has often tried it with ſucceſs.

> "Steep ſome regulus of antimony in ale, adding thereto ſome grains of paradiſe, and a little ſugar to ſweeten it. Of this infuſion ſomewhat leſs than a gill is to be given to every one of your affected ſheep: they are to have two or three doſes, according as they are more or leſs affected by the diſtemper, allowing two days intermiſſion between each doſe."

"This is ſaid, as I have already obſerved, to be a cure almoſt certain.

"I juſt now took notice, that when rain falls in the months of May and June it is apt to cauſe the rot in ſheep: it will be neceſſary to add, that folding them in the above months encreaſes the diſorder; for after having been deprived of their liberty during the whole night, they bite the noxious graſs the more greedily in the morning, having leſs ceremony in their choice of herbs than if they were not folded. This is a matter of ſome conſequence, therefore worthy of being attended to.

"One thing more I muſt, on the authority of Mr. Liſle, communicate to your readers, viz. an obſervation of a Leiceſterſhire farmer; that ſheep, when firſt touched with the rot, will thrive mightily in fatting for ten weeks; but if they are not diſpoſed of when they are come up to a pitch, they will, in ſeven or eight days time, fall away to nothing but ſkin and bone. The ſame farmer obſerved, that he had often had them die in the height of their pitch, in half an hour's time, with twenty-ſeven pound of tallow in their bellies." *Muſeum Ruſticum*, *vol.* I. *page* 434.

To this account we ſhall add a receipt communicated to Mr. Mills by a gentleman of Lincolnſhire.

"Steep

" Steep a handful of rue in a pail of water all night, and at morning put in as much ſalt as will make it bear an egg. Give each ſheep half a pint of this liquor, and repeat it thrice, every other morning.

" A farmer who kept four hundred ſheep tried this receipt in the laſt general rot (about five years ago), and did not loſe any, though his neighbours loſt almoſt all theirs. For the ſake of the experiment, he ſet apart about twenty, and did not give them this drink. Many of theſe were rotten." *Mills's Huſbandry, vol.* III. *p.* 416.

Buck-bean, or marſh-treſoil, is alſo excellent in this diſtemper. *See the article* BUCK-BEAN.

ROUGHINGS, latter-graſs, aftermaths.

ROUP, the name of a filthy diſeaſe in poultry, conſiſting of a boil or ſwelling upon the rump, and is known by the ſtaring, or turning back of the feathers.

The roup, if not ſoon remedied, will corrupt the whole body of the fowl; to prevent which the feathers ſhould be plucked away, the ſwelling laid open, and the matter preſſed out; after which the part is to be waſhed with brine, or ſalt and water.

ROWEL, a kind of iſſue made in horſes for the cure of various diſorders, as inward ſtrains, hard ſwellings, &c.

The operation is performed in the following manner:

A little ſlit being made through the ſkin, about a handbreadth below the part aggrieved, big enough to put a ſwan's quill in, the ſkin is raiſed from the fleſh, the end of the quill put in, and the ſkin blowed from the fleſh upwards, and all over the ſhoulder; then, the hole being ſtopped with the finger, the part blown is beat with a hazle-ſtick, and the wind ſpread with the hand all over, and then let go; this done, a ſkain of horſe-hair, or red ſarſenet, half the thickneſs of the little finger, is put in a rowelling-needle, ſeven or eight inches long, and the needle is put into the hole, and drawn through again, ſix or ſeven inches higher; then the needle is drawn out, and the two ends of the rowel tied together, anointing it every day, as well before the putting it in, with ſweet butter and hog's greaſe, and drawing it backwards and forwards in the ſkin, to make the putrid matter diſcharge itſelf more plentifully.

Others diſliking theſe rowels, as making too large a ſore and ſcar, uſe the French rowel, which is a round piece of ſtiff leather, with a hole in the midſt, laying it flat between the fleſh and the ſkin, the hole in the rowel juſt againſt that in the ſkin, ſewing it with a needle and thread drawn through the hole and the ſkin, cleaning it once in two or three days, and then anointing it afreſh.

" The general and abſurd reaſoning of farriers, ſays Mr. Bartlet, on the effects and uſe of rowelling, makes the following obſervations the more neceſſary, as it is too notorious how impertinently they talk on this ſubject: for in ſhort with them, a rowel is to draw off all the bad and corrupt humours from the blood, by a ſort of magic.

" It is neceſſary to obſerve that the matter generally diſcharged by a rowel, is nothing more, than an ouzing from the extremities of the veſſels divided in the making of it; in fact then, it is blood, which loſes its colour, by being ſhed out of the veſſels, the warmth of the part, and its confinement.

" If this is granted, it will evidently appear, that the good effects enſuing this operation, muſt be owing to a gradual depletion, or emptying of the veſſels in general; by which means the ſurchage or load on a particular part, is taken off and removed; and impurities or bad juices (generally called humours) run off with the good, in proportion to their quantity in the blood.

" To imagine particular humours are thus ſeparately, and alone diſcharged from the blood, thro' theſe orifices, is an opinion but too generally received, tho' a very abſurd one; and muſt be very pernicious in its conſequences, from the bad effects it may have in practice; as muſt the ſame reaſoning alſo in regard to purging.

" Thus to lean hide-bound horſes, and thoſe of a dry hot conſtitution, the diſcharge, by depriving the conſtitution of ſo much blood, and fluids, is daily exhauſting the ſtrength of the animal; and may be productive of bad conſequences, by defrauding the conſtitution of a neceſſary fluid.

" But in diſorders from fullneſs, attended with acrimony, or ſharpneſs of the juices, and with defluxions on the eyes, lungs, or any part of conſequence; the gradual diſcharge brought on by theſe means, will contribute to leſſen the fullneſs on the parts affected, and give the veſſels an opportunity of recovering their tone, while evacuating and alterative medicines are doing their office.

" It may be neceſſary however to obſerve, that there is a wonderful communication between the veſſels of the cellular membrane under the ſkin, which remarkably appears, by inflating thoſe of ſheep, calves, &c. by the butchers: hence probably it is that ſome diſorders of this integument, are ſo apparently relieved by iſſues, or rowels, without our having any recourſe to that general depletion of the veſſels we have juſt obſerved, to account for it; and hence alſo may be deduced their utility, ſometimes in draining off any extravaſated fluids, which may lodge between the interſtices of the muſcles, after violent ſtrains of the ſhoulder; alſo in diſcharging ſuch vicious, or ſharp fluids, as are thrown on the membranes, and occaſion thoſe flying pains and lameneſſes, which we find are often removed by this local remedy." *Bartlet's Farriery, page* 220.

ROWEN, *or* ROWET, winter-graſs.

ROWTY, over-rank, too ſtrong.

RUDDLE, a ſort of red earth, of a lax texture, and very eaſily reduced to powder. It is found in ſeveral parts of England, eſpecially in Derbyſhire; and is much uſed in marking ſheep.

RUNCHES, charlock when dry and withered.

RUNNEL, pollard wood.

RUNNET, the acid juice found in the ſtomachs of calves, that have fed on nothing but milk, and are killed before the digeſtion is perfect. It alſo ſignifies a liquor made by ſteeping of the ſtomach of a calf in hot water. The latter is the runnet uſed in making cheeſe, &c.

RUNNING-THRUSH, *or* FRUSH, is an impoſthume that ſometimes gathers in a horſe's frog; or a ſcabby and ulcerous diſpoſition, which ſometimes cauſes it to fall off.

When this diſcharge is natural the feet ſhould be kept clean, but no drying waſhes made uſe of, it being thought as unſafe to repel ſome of theſe diſcharges, as to cure ſome ſweaty feet.

When an impoſthume, or gathering appears, the ſafeſt way is to pare out the hard part of the frog, or whatever appears rotten; and waſh the bottom of the foot two or three

three times a day with old chamberlye; this is the ſafeſt and beſt way of treating them. But when a horſe has been neglected, and there is a ſtrong flux to the part, it is apt to degenerate into a canker, to prevent which, uſe the following:

Take ſpirit of wine and vinegar, of each two ounces, tincture of myrrh, and aloes one ounce; Ægyptiacum half an ounce; mix together.

Bathe the thruſh with this, wherever there appears a more than ordinary moiſture, and lay over the ulcer a little tow dipped in the ſame. The purges and diuretics recommended in the greaſe, ſhould be given at this time, to prevent the inconveniencies that the drying up theſe diſcharges frequently occaſion. *See the article* CANKER. *Bartlet's Farriery, page,* 312.

RUNT, a name given to the ſmall black cattle brought out of Wales and Scotland.

RUNT, is alſo an epithet applied to ſeveral ſpecies of pigeons; as the Leghorn, Spaniſh, and Frieſland runt, &c.

The Leghorn runt is a ſtately large pigeon, ſeven inches or better in the legs, cloſe feathered and faſt-fleſhed, extremely broad-breaſted, and very ſhort in the back. He carries his tail, when he walks, ſomewhat turned up like a duck's, his neck is longer than any other pigeon's, and he carries it bending like a gooſe or ſwan. He is gooſe-headed, and his eye lies hollow in his head, with a thin ſkin round it, like that of the Dutch tumbler. His beak is very ſhort for ſo large a bird, and has a ſmall wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender and requires care.

The Spaniſh runt is the longeſt-bodied of all the pigeons; it is ſhort-legged and looſe-feathered, and does not walk ſo upright as the Leghorn runt. Theſe are of a great variety of colours, but are apt to have accidents in ſitting, from their ſitting too heavy, and often breaking their eggs.

The Frieſland runt is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman runt is a pigeon of the ſame general make with the common kind, but ſo large and heavy that it can hardly fly.

The Smyrna runt is middle-ſized, and is feather-footed, and to ſuch a degree ſometimes, as to look as if there were wings upon the foot; the feathers of theſe are ſometimes four or five inches long, and often pull the eggs and young out of the neſts. The common runt is the common blue pigeon kept for the table, and known to every body. *Moore's Columbarian.*

RUPTURE, a preternatural eruption of the guts or caul.

In regard to ruptures, though they are generally divided into particular claſſes, we ſhall only obſerve, that by violent efforts of the horſe, or other accidents, the guts or caul may be forced between the muſcles of the belly at the navel, and thro' the rings of the muſcles into the ſcrotum or cod. The ſwellings are generally about the ſize of a man's fiſt, ſometimes much larger, deſcending to the very hock; they are frequently ſoft, and yield to the preſſure of the hand, when they will return into the cavity of the belly with a rumbling noiſe; and in moſt the vacuity may be felt, through which they paſſed.

On their firſt appearance, endeavours ſhould be made to return them by the hand; but if the ſwelling ſhould be hard and painful, in order to relieve the ſtricture, and relax the parts, through which the gut or caul has paſſed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a day, applying over it a poultice made with oatmeal, oil and vinegar, which ſhould be continued till the ſwelling grows ſoft and eaſier, or the gut is returned. In the mean time it would be proper to throw up emollient oily clyſters twice a day, and to let the horſe's chief diet be boiled barley, ſcaled malt, or bran.

Should the ſwelling afterwards return, we apprehend the reſtringent applications uſually recommended on theſe occaſions, will avail little without a ſuſpenſory bandage; ſo that an ingenious mechanic in that art is chiefly to be relied on, for any future aſſiſtance; though it has been obſerved, that with moderate feeding, and gentle exerciſe, ſome horſes have continued to be very uſeful under this complaint. *Bartlet's Farriery, page* 334.

RUSH, the name of a well known plant, too common in wet lands.

Ruſhes always intimate a good ſoil; and may be deſtroyed by lime, even after it has been ſlaked, by ſea-coal aſhes, and by draining the land.

Ruſhes thrive moſt in land, that is too wet and cold for moſt other plants. Aſhes and other warm manures of various kinds, laid on plentifully, will keep down the ruſhes, for a time; but to eradicate them perfectly, it is neceſſary alſo to well drain the land.

RUST, a diſtemper incident to corn and generally called mildew. *See the artice* MILDEW.

RYE, a ſpecies of corn greatly cultivated in the northern parts of England.

Mr. Miller is of opinion that all the rye ſown in England is of the ſame ſpecies, though diſtinguiſhed by farmers into two varieties of winter and ſpring rye, as he has not been able, by the moſt ſedulous experience, to find any difference.

The winter rye, which has the largeſt grain, is what the generality of farmers cultivate. It is uſually ſown in autumn, or at the ſame time as wheat; and in many of our northern counties, as well as in Wales, they are often mixed and ſown together; tho' as Mr. Miller rightly obſerves, this muſt be very bad huſbandry, becauſe the rye will always ripen ſooner than the wheat; ſo that if the latter be ſuffered to ſtand till fully ripe, the grain of the former will ſhed; nor can this be practiſed where the people are not accuſtomed to eat rye-bread; for though ſome account it good when mixed, it is ſo very clammy that few who have been uſed to wheaten bread will ever reliſh it.

Rye is generally ſown on poor, lime-ſtone, dry, gravelly, or ſandy ſoils, where wheat will not thrive, and in ſuch places it does very well. The ground ſhould be dry when it is ſown: for if much rain falls, even after the ſowing, before the rye is come up, it often rots in the earth. It indeed riſes in a much ſhorter time than wheat.

When ſown upon light land, it ripens much earlier than a cold ſtiff ground, and by continuing to ſow it in ſuch a ſoil during two or three years, it will be forwarded ſo much as to ripen a month earlier than that which has been long raiſed upon ſtrong cold ground. For this reaſon, thoſe who are obliged to ſow rye toward ſpring,

ſpring, generally provide themſelves with this early ſeed. A little ſprinkling of dung or mud, though it be but half the quantity commonly uſed for other corn land, will, if laid upon the rye ground, greatly advance the crop. The uſual allowance is two buſhels of ſeed to a ſtatute acre, or, if it be new broke up ground, or land ſubject to worms, about a peck more; and the produce commonly is about twenty buſhels upon an acre.

In the ſummer of the year 1699, which was uncommonly dry, Mr. Mortimer reckoned ninety grains apiece in ſeveral ears of rye.

The ſmall rye may be ſown in the ſpring, about the ſame time as oats, and uſually ripens as ſoon as the other ſort: but if the ſeaſon prove wet, it is apt to run much to ſtraw, and the grain is generally lighter than the other. The chief uſe of this ſort is to re-ſow lands where the autumnal crop has failed.

This corn is ripe when its ſtraw turns yellow, its ear hangs, and its grain is hard. It is not very apt to ſhed; and therefore, if it be weedy (though this ought never to be the caſe with any corn) it ſhould be let lie upon the ground, or gavel, as ſome call it, a week or ten days after it is cut, if the weeds do not dry ſooner, before it be bound up; for otherwiſe thoſe weeds will give in the barn, make the rye not thraſh well, and render it muſty. But as this grain will grow in the ear ſooner than any other, if it be wet, particular care muſt be taken, eſpecially if rain comes on, to turn it at leaſt once in two or three days, and lay the ears upon the ſtubble, as high above the ground as can be. This will help to preſerve it from hurtful moiſture: but if it be cut in perfectly dry weather, and without weeds, it may be houſed as it is reaped.

The general uſe of rye is for bread, either alone, or mixed with wheat, in which ſtate it is called meſlin corn. It alſo yields a ſtrong ſpirit when diſtilled; and, if ſowed only for dreſſing of land, is of vaſt ſervice to the ground where it is plowed in green and ſucculent. The truly worthy, and reverend Dr. Elliot informs us, that he has not only been told, but knows by his own obſervation, that if rye be ſowed ſucceſſively every year upon the ſame land, both the crop and the land will be greatly improved; inſomuch that ſome grounds which would yield but five buſhels to the acre at firſt have, in time, afforded a crop of fifteen buſhels to the acre, without the charge of dung, or any manure. But it ſhould be remembered that the land ſown by Dr. Elliot was newly broke up.

This plant is likewiſe ſown in autumn to great advantage, purpoſely for green feed for cattle, particularly for ews and lambs in the ſpring, before there is plenty of graſs. When this is intended the rye ſhould be ſown early, that it may have ſtrength to furniſh early fodder. In this light, it ſupplies the want of turnips where they have failed, or where their ſeaſon is over: ſo that, in ſuch caſes, it is very good huſbandry to ſow the land with rye, eſpecially where there are flocks of ſheep, which cannot be well ſupported without green food early in the ſpring. The farmer who has many ſheep ſhould conſider, that turnips are always a very precarious crop; and therefore he ſhould, beſides ſowing ſome places with cole-ſeed, in order to have green fodder, ſow rye in others, to guard againſt accidents. If ſome of the ground ſowed late with turnips, which have failed, be ſown in the autumn with rye, he will find it turn to good account. To have green fodder for cattle in April, which is the ſcarceſt time of all the year, ſome ſplit the ridges of their wheat-ſtubble, and ſow them with rye, allowing about a buſhel to an acre, which they harrow in, and feed about April, or when they want it; and in May they plough it up for a fallow.

RYE-GRASS. *See the article* RAY-GRASS.

S.

SAFFRON, a genus of plants with narrow graſs-like leaves, which have a white line running along the middle: the ſtalk is ſhort and undivided, and bears on the top a purpliſh blue flower, deeply cut into ſegments: in the middle of the flower ariſes, among the ſtamina, a whitiſh piſtil, divided at the top into three chives or fleſhy filaments, the lower part of which is ſlender and pale coloured, the upper broader, of a deep orange red, and very finely indented about the ſides: theſe filaments, carefully picked, and preſſed together into cakes, are the ſaffron of the ſhops. The plant is perennial, and flowers in autumn.

As ſaffron grows at preſent moſt plentifully in Cambridgeſhire, and has grown formerly in ſeveral other counties in England, the method of culture does not, I believe, vary much in any of them; and therefore I judge

judge it ſufficient to ſet down here the obſervations which I employed proper perſons, in different ſeaſons to make, in the years 1723, 1724, 1725, and 1728, up and down all that large tract of ground that lies between Saffron-Walden and Cambridge, in a circle of about ten miles diameter.

In that county ſaffron has moſt been cultivated; and therefore it may reaſonably be expected, that the inhabitants thereof are more thoroughly acquainted with it than they are any where elſe.

I ſhall begin with the choice and preparation of the ground: the greateſt part of the tract already mentioned is an open level country, with few incloſures; and the cuſtom there is, as in moſt other places, to crop two years, and let the land lie fallow the third. Saffron is always planted upon fallow ground, and, all other things being alike, they prefer that which has borne barley the year before.

The faffron grounds are ſeldom above three acres, or leſs than one; and in chooſing, the principal thing they have regard to is, that they be well expoſed, the ſoil not poor, nor a very ſtiff clay, but temperate dry mould, ſuch as commonly lies upon chalk, and is of an hazel-colour; though, if every thing elſe anſwers, the colour of the mould is pretty much neglected.

The ground being made choice of about Lady-day or the beginning of April, it muſt be carefully plowed, the furrows being drawn much cloſer together, and deeper, if the ſoil will allow it, than it is done for any kind of corn; and, accordingly, the charge is greater.

About five weeks after, during any time in the month of May, they lay between twenty and thirty loads of dung upon each acre; and, having ſpread it with great care, they plow it in as before; the ſhorteſt rotten dung is the beſt; and the farmers, who have the conveniency of making it, ſpare no pains to make it good, being ſure of a proportionable price for it. About Midſummer they plow a third time, and between every ſixteen feet and a half or pole in breadth, they leave a broad furrow or trench, which ſerves both as a boundary to the ſeveral parcels, when there are ſeveral proprietors to one incloſure, and to throw the weeds in at the proper ſeaſon.

To this head likewiſe belongs the fencing of the grounds, becauſe moſt commonly, though not always, that is done before they plant. The fences conſiſt of what they call dead hedges, or hurdles to keep out not only cattle of all ſorts, but eſpecially hares, which would otherwiſe feed on the ſaffron leaves during the winter.

About the weather we need only obſerve, that the hotteſt ſummers are certainly the beſt: and therewith, if there be gentle ſhowers from time to time, they can hardly miſs of a plentiful crop, if the extreme cold, ſnow, or rain of the foregoing winter have not prejudiced the heads.

The next general part of the culture of ſaffron, is planting or ſetting the roots: the only inſtrument uſed for which is a narrow ſpade, commonly termed a ſpit-ſhovel.

The time of planting is commonly in July, a little ſooner or later, according as the weather anſwers. The method is this: one man with his ſpit-ſhovel raiſes between three and four inches of earth, and throws it before him about ſix or more inches; two perſons, generally women, following with heads, place them in the fartheſt edge of the trench he makes, at three inches diſtance from each other, or thereabouts: as ſoon as the digger or ſpitter has gone once the breath of the ridge, he begins again at the other ſide, and digging, as before, covers the roots laſt ſet, and makes the ſame room for the ſetters to place a new row, at the ſame diſtance from the firſt as they are from one another: thus they go on, till a whole ridge, containing commonly one rod, is planted; and the only nicety in digging is, to leave ſome part of the firſt ſtratum of earth untouched, to lie under the roots; and, in ſetting, to place the roots directly upon their bottom.

What ſort of roots are to be preferred, ſhall be ſhewn under the fourth head; but it muſt be obſerved in this place, that formerly, when roots were very dear, they did not plant them ſo thick as they do now, and that they have always ſome regard to the ſize of the roots, placing the largeſt at a greater diſtance than the ſmaller ones.

The quantity of roots, planted in an acre, is generally about ſixteen quarters, or one hundred and twenty-eight buſhels, which, according to the diſtances left between them, as before aſſigned, and ſuppoſing all to be an inch in diameter one with another, ought to amount to three hundred and ninety-two thouſand and forty in number.

From the time that the roots are planted, till about the beginning of September, or ſometimes latter, there is no more labour about them; but as they then begin to ſpire, and are ready to ſhew themſelves above ground, which is known by digging a few out of the earth, the ground muſt be carefully pared with a ſharp hoe, and the weeds, &c. raked into the furrows, otherwiſe they would hinder the growth of the plants.

In ſome time after appear the ſaffron flowers; and this leads us to the third branch of our preſent method. The flowers are gathered as well before as after they are full blown; and the moſt proper time for this is early in the morning. The owners of the ſaffron get together a ſufficient number of hands, who place themſelves in different parts of the field, pull off the whole flowers, and throw handful by handful into a baſket, and ſo continue till all the flowers are gathered, which happens commonly about ten or eleven o'clock. Having then carried home all they have got, they immediately ſpread them upon a large table, and fall to picking out the filamenta ſtyli, or chives, and together with them a pretty long proportion of the ſtylus itſelf, or ſtring to which they are joined; the reſt of the flower they throw away as uſeleſs. The next morning they return into the field again, whether it be wet or dry, weather; and ſo on daily, even on Sundays, till the whole crop be gathered.

The chives being all picked out of the flowers, the next labour about them is to dry them on the kiln. The kiln is built upon a thick plank, that it may be removed from place to place, ſupported by four ſhort legs: the outſide of eight pieces of wood about three inches thick, in form of a quadrangular frame, about twelve inches ſquare at the bottom on the inſide, and twenty-two inches at top; which is likewiſe equal to the perpendicular height of it. On the foreſide is left a hole about eight inches ſquare, and four inches above the plank, through which the fire is put in. Over all the reſt laths are laid pretty thick, cloſe to one another, and nailed to the frame already mentioned; and then are plaſtered over on both ſides, as are alſo the planks at bottom very thick, to ſerve for an hearth. Over the mouth or wideſt part goes an hair-cloth, fixed to the ſides of the kiln; and

likewiſe to two rollers, or moveable pieces of wood, which are turned by wedges or ſcrews, in order to ſtretch the cloth. Inſtead of the hair-cloth, many people now uſe a net work, or iron wire, with which it is obſerved that the ſaffron dries ſooner and with a leſs quantity of fuel: but the difficulty in preſerving the ſaffron from burning, makes the hair-cloth be preferred by the niceſt judges in drying.

The kiln is placed in a light part of the houſe; and they begin by laying five or ſix ſheets of white paper on the hair cloth, upon which they ſpread the wet ſaffron, between two and three inches thick: this they cover with other ſheets of paper, and over theſe they lay a coarſe blanket five or ſix times doubled; or, inſtead thereof a canvas pillow filled with ſtraw; and, after the fire has been lighted for ſome time, the whole is covered with a board, having a large weight upon it.

At firſt they give it a pretty ſtrong heat, to make the chives ſweat, as their expreſſion is; and in this, if they do not uſe a great deal of care, they are in danger of ſcorching, and ſo of ſpoiling all that is on the kiln.

When it has been thus dried about an hour, they take off the board, blanket, and upper papers, and take the ſaffron off from that which lies next it; raiſing at the ſame time, the edges of the cake with a knife; then, laying on the paper again, they ſlide in another board between the hair-cloth and under papers, and turn both papers and ſaffron upſide down; afterwards covering them, as above.

This ſame heat is continued for an hour longer; then they look on the cake again, free it from the papers, and turn it: then they cover it, and lay on the weight, as before. If nothing happens amiſs during theſe firſt two hours, they reckon the danger to be over: for they have nothing more to do, but to keep a gentle fire, and to turn their cakes every half-hour, till thoroughly dry: for the doing which as it ought, there are required full twenty-four hours.

In drying the layer of plump chives they uſe nothing more, but towards the latter end of the crop, when theſe come to be ſmaller, they ſprinkle the cake with a little ſmall beer, to make it ſweat as it ought; and they begin now to think, that uſing two linnen cloths next the cake, inſtead of two innermoſt papers, may be of ſome advantage in drying: but this practice is followed as yet but by few.

Their fire may be made of any kind of fuel; but that which ſmokes the leaſt is beſt; and charcoal, for that reaſon, is preferred to any other.

What quantity of ſaffron a firſt crop will produce, is very uncertain; ſometimes five or ſix pounds of wet chives are got from one root; ſometimes not above one or two, and ſometimes not enough to make it worth while to gather and dry it. But this is always to be obſerved, that about five pounds of wet ſaffron go to make one pound of dry, for the firſt three weeks of the crop; and ſix pounds during the laſt week; and now the heads are planted very thick, two pounds of dried ſaffron may, at a medium, be allowed to an acre for the firſt crop, and twenty-four pounds for the two remaining; the third being conſiderably larger than the ſecond.

In order to obtain theſe, there is only a repetition to be made every year of the labour of hoeing, gathering, picking, and drying, in the ſame manner as before ſet down, without the addition of any thing new; except that they let the cattle into the field, after the leaves are decayed, to feed upon the weeds; or, perhaps, mow them for the ſame uſe.

About the Midſummer after the third crop is gathered, the roots muſt all be taken up and tranſplanted: the management requiſite for which is the fourth thing to be treated of. To take up the ſaffron heads, or break up the ground, as the term is, they ſometimes plough it, ſometimes uſe a forked kind of hoe, called a pattock, and then the ground is harrowed once or twice over; during all which time of ploughing or digging, and harrowing, fifteen or more people will find work enough to follow and gather the heads, as they are turned up.

They are next to be carried to the houſe in ſacks, and there cleaned and raiſed: this labour conſiſts in cleaning the roots thoroughly from the earth, and from the remains of old roots, old involucra, and excreſcences; and thus they become fit to be planted in new ground immediately, or to be kept for ſome time, without danger of ſpoiling.

The quantity of roots taken up, in proportion to thoſe which were planted, is uncertain; but, at a medium, it may be ſaid, that, allowing for all the accidents which happen to them in the ground, and in breaking up from each acre, may be had twenty-four quarters of clean roots, all fit to be planted.

The owners are ſure to chuſe for their own uſe the largeſt, plumpeſt, and fatteſt roots; but do leaſt of all approve the longeſt-pointed ones, which they call ſpickets, or ſpickards; for very ſmall round or flat roots are ſometimes obſerved to flower. This is the whole culture of ſaffron in the county abovementioned; and we have only now to conſider the charges and profits which may be ſuppoſed, one year with another, to attend that branch of agriculture; and of theſe I have drawn up the following computation for one acre of ground, according to the price of labour in this county.

	l.	s.	d.
Rent for three years	3	00	0
Ploughing for three years	0	18	0
Dunging	3	12	0
Hedging	1	16	0
Spitting and ſetting the heads	1	12	0
Weeding or paring the ground	1	04	0
Gathering and picking the flowers	6	10	0
Drying the flowers	1	06	0
Inſtruments of labour for three years, with the kiln, about	0	10	0
Plowing the ground once, and harrowing twice	0	12	0
Gathering the ſaffron heads	1	00	0
Raiſing the heads	1	12	0
Total charge	23	12	0

This calculation is made upon ſuppoſition, that an acre of ground yields twenty-ſix pounds of net ſaffron in three years; which I ſtated only as a mean quantity between the greateſt and the leaſt; and therefore the price of ſaffron muſt be judged accordingly; which I think cannot be done better than by fixing it at thirty ſhillings per pound; ſince, in plentiful years, it is ſold at twenty, and is ſometimes worth three or four pounds: at this rate, twenty-ſix pounds of ſaffron are worth thirty-nine pounds: and the net profits of an acre of ground, producing

ducing saffron, will, in three years, amount to fifteen pounds thirteen shillings, or about five pounds four shillings yearly.

This, I say, may be reckoned the net profit of an acre of saffron, supposing that all the labour were to be hired for ready money: but, as the planter and family do a considerable part of the work themselves, some of this expence is saved: that is, by planting saffron, he may not only reasonably expect clear about five pounds yearly per acre, but also to maintain himself and family for some part of each year: and it is upon this supposition only, that the result of other computations can be said to have any tolerable degree of exactness; but the calculations themselves are undoubtedly very inaccurate.

I have said nothing here concerning the charge in buying, or profits in selling the saffron heads; because in many large tracts of ground, these must at length balance one another, while the quantity of ground planted yearly continues the same; which has been pretty much the case for several years past. *Philosophical Transactions, Numb.* 405.

SAINTFOIN, *or* SAINFOIN, the name given by the French, and continued by us to a species of plant, frequently used for the food of cattle, either fresh or dried; it is called holy-hay, or wholesome hay, from its excellent nutritive quality. The stalks of the plant are commonly about two feet long, but they grow sometimes to five or six feet, and it has tufts of red flowers of three, four, or five inches in length.

This plant will make a forty times greater increase in poor ground than the common turf; and this is owing to its having a long perpendicular root, of that kind, called tap roots, which sinks to a great depth to attract its nourishment. The length of this root is scarce to be credited by any but those who have seen it; it is frequently drawn out of the ground to the length of twelve or fourteen feet, but is said to be often thirty feet or more in length.

The farmers have a general opinion, that this plant never succeeds well in any land, where there is not an under stratum of stone, or chalk, or some other hard matter, to stop its running; but that otherwise it spends itself in root, and comes to nothing above ground. This is an error too gross to need much refutation. It is certain, that the roots being to plants what the stomach and guts are to animals, the more and larger roots any plant has, the more nourishment it receives, and the better it thrives.

Saintfoin always succeeds where its roots run deep, and the best crops of all are produced upon lands where there is no hard under soil to obstruct their passage. An under soil of clay may kill the plants, by retaining the water, and chilling and roting their roots.

The long root of saintfoin has, near the surface, many horizontal roots issuing from it, which extend themselves every way; there are of the same kind all the way down, as the roots go, but they grow shorter and shorter all the way. Any dry land may be made to produce this valuable and useful plant, though it be ever so poor, but the richest and best land will produce the best crops of it. The best way of sowing it is by drilling; but the earth must be very well prepared, and the seed well ordered, or else very little of it will grow. The heads of these seeds are so large, and their necks so weak, that, if they be much more than half an inch deep, they are not able to rise through the incumbent mould; and, if they are not covered, they will be malted, as the farmers express it; that is, it will send out its roots while it lies above-ground, and be killed by the air; and whether the farmer plants bad seed that will not grow, or good seed that is buried or malted, the event will be the same. The ground will be understocked with plants. A bushel of seed to an acre of land is full twenty seeds to each square-of foot land; but, as there are some difference in the largeness of the seeds, there is no absolute certainty as to this calculation. The worst seasons for planting are the beginning of winter, and the drought of summer; the best is the beginning of the spring; and it is also strongest when planted alone, and is not sown together with corn, as is the practice of some farmers. If barley, oats, or any other corn, sown with the saintfoin, happen to be lodged afterwards, it kills the young saintfoin. If it be planted with any other corn, it is best done by drilling in the horse-hoeing way; in this case it is not much liable to be killed by the lodging of the corn, as the drilled corn seldom falls at all, and, when it does, never falls so low as the sown corn.

The quantity of seed to be drilled upon an acre of land will depend wholly upon the goodness of it; for there is some seed of which not one in ten will strike, whereas in good seed not one in twenty will fail. The method of knowing the goodness, is, by sowing a certain number of the seeds, and seeing how many plants are produced by them. The external signs of the seeds being good are, that the husk is of a bright colour, and the kernel plump, of a light grey or blue colour, and sometimes of a shining black. The seed may be good, though the husk be black, as that is owing sometimes to the letting it receive the wet in the field, not to its being half rotted in the heap.

If the kernel be cut a-cross, and appear greenish and fresh, it is a certain sign that it is good. If it be of a yellowish colour, and friable, and looks thin and pitted, they are bad signs. The quantity of seeds allowed to acre in the drill way is much less than that by sowing, and it is to be computed according to the number of plants that are to be allowed in that space, allowing for the common casualties. It is not necessary to be exact in this calculation, or to say whether two, three, or four hundred plants are to be allowed to a square perch; neither is it possible to know before hand the precise number of plants that may live out of those that come up; for sometimes the grub takes them when they have only the two first leaves, and the crop is greatly diminished by this means. Four gallons of good seed to an acre of land will cover it with plants, when judiciously managed.

Single plants of saintfoin make the greatest crops; but the farmers, in general, plant them so close, that they starve one another. The single plants always run the deepest, and those which do so will always draw most nourishment. The plants which stand crowded starve one another, and often die after a few years; but the single ones grow to a vast bigness, and are every year better and better.

The best way to calculate how many plants are to be allowed to a perch, is to compute how much hay each single large plant will produce; for, if kept single, and well cultivated, they will all be large ones. Without culture, these plants never arrive at a fourth part of the size that they do with it. The hay of a large single cul-

vivated plant will weigh more than half a pound, a hundred and twelve plants upon a ſquare perch, weighing but a quarter of a pound a piece, one with another, amount to two tons to an acre. If ſaintfoin be planted on ſome ſorts of land early in the ſpring and hoed, it will ſometimes produce a crop the following ſummer; in a garden the ſeeds ſown in February will yield plants of two feet high that will flower in the month of June following; and, though March be froſty, the young plants ſeldom ſuffer by it. This ſhews, that this plant is naturally a quick grower; but the farmers uſually plant it on poor or cold land, and give it too little culture, which make it backward, and ſlow of growth with them. The poor land, uſually allotted to this plant, alſo makes it generally yield but one crop a year, but on a rich land it will yield two very good crops annually, with a moderate ſhare of culture and management.

The farmer who expects to make a profit of this plant muſt not expect a good crop the firſt year. Nothing is ſo injurious to ſaintfoin as its ſtanding too thick; if it be ſown ſo thick as to cover the ground the firſt ſummer, the plants will ſtarve one another for ever after; but, if the owner will be content to place them ſo thinly as to have but a ſmall crop the firſt year, they will increaſe prodigiouſly, and every ſucceeding crop will be better and better. When ſaintfoin is well hoed, it will grow as much in a fortnight as it would otherwiſe do in ſix weeks; and this quick growing is of advantage to it every way, not only making the plants large, but of better nouriſhment to the cattle, whether they are eaten green or made into hay.

The proper diſtance to drill this plant for the horſe-hoeing huſbandry is at double rows with eight inch partitions between them, and thirty inch intervals between every two and two. Theſe intervals need only be hoed alternately, leaving every other interval for making the hay on. This method of hoeing is of vaſt advantage, and poor land by means of it will always produce two crops a year. The land is always to be perfectly cleared of graſs before the ſowing the ſaintfoin, and the lumps of earth carefully broken. But no harrowing is to be allowed after it is drilled, for that would bury it; and, it is not proper to roll it at all, unleſs for the ſake of barley, when they are ſown together; and when that is done, it ſhould be with a light roller, and in dry weather. This ſhould be done lengthwiſe of the rows, and as ſoon as it is drilled; if it be not done at this time, it is beſt to ſtay three weeks before it be done, that the necks of the young ſaintfoin may not be broken.

No cattle are to be ſuffered to come in the firſt winter upon the ſaintfoin, after the corn is out, among which it was ſown. Their feet would injure it by treading the ground hard, as much as their mouths by cropping it, and it would never come to good. Sheep ſhould not be ſuffered to come at it, even the following ſummer and winter. One acre of drilled ſaintfoin, conſidering the difference of the quantity and goodneſs of the crop, is worth two acres of ſown ſaintfoin on the ſame land, though the expence of drilling be twenty times leſs than that of ſowing. The firſt winter is the time to lay on manure after the corn is reaped off. Peat-aſhes, or the like, are very proper, and a ſmall quantity of them will do, as there are at this time no other plants to partake of the benefit, but the young crop has it all; and the young plants, being thus made ſtrong at firſt, will continue ſo, and be long the better for it.

It is obſerved, however, that in the drilling and horſe-hoeing-way there is no neceſſity for any manure at all. Some farmers ſow eight or ten buſhels of the ſeed of ſaintfoin to an acre along with their corn, with intent that it ſhould kill all the other weeds; but the conſequence is, that the plants ſtand cloſe, and ſtarve one another, and are no bigger than where the plant grows wild on the hills in Calabria, where it is ſo ſmall and ſeemingly deſpicable a plant, that it ſeems a wonder that any body ſhould be tempted to think of cultivating it: yet, when rightly managed, it ſeems capable of being as uſeful a plant as any in the world. Where theſe plants ſtand ſo thick, they draw out all the nouriſhment from the ground, in a few years, and ſo die, though manured ever ſo carefully. Six or ſeven years ſeems their greateſt duration; whereas, when the ſeed is drilled in, and the plants are horſe hoed, they will be as ſtrong and vigorous as ever, at thirty years ſtanding.

Some people who have turned their thoughts to huſbandry, have been of opinion, that the cytiſus would ſucceed better with us than the ſaintfoin; it is probable enough that it would grow well; but the labour of ſheering it would, with us, where the pay of ſervants is ſo dear, run away with the greateſt part of the profits of the crop.

Lucerne is another thing which many have thought of introducing among us in the place of ſaintfoin, but it requires ſo much care to ſuit it with a proper ſoil, that, whatever are the profits of it, it never can be ſo general as ſaintfoin. *Tull's Horſe-hoeing Huſbandry.*

Saintfoin, ſays Mr. Duhamel, deſerves the farmer's utmoſt attention, as one of the moſt profitable plants he can cultivate. It will do on almoſt any land; and though it ſucceeds beſt in good ſoils, yet it will grow even on dry barren ſpots, where ſcarce any other graſs can live; provided its roots be not chilled by a cold clay, or other ſubſtance which retains water: and it has this farther advantage, that it may be mowed at different degrees of ripeneſs, with nearly the ſame profit.

1. It may be mowed before it is in bloom, for it is then admirable food for horned cattle; and when cut thus early, it yields a ſecond crop, which makes ample amends for what was loſt by not letting the firſt come to its full growth. This early cutting is likewiſe attended with another benefit, which is, that it purges cattle, in the beginning of the ſummer, and thereby frees them from diſorders occaſioned by the winter's cold, or dry food.

2. If the weather be rainy, the ſaintfoin may be left ſtanding till it is in bloom; when it ſtill is excellent fodder for cows. But care muſt be taken in making it into hay, that the flowers do not drop off, as they are very apt to do: for cattle are ſo fond of theſe flowers, that they often induce them to eat the reſt of the plant.

3. If the rain continues, the ſaintfoin may be left ſtanding till ſome of its ſeeds are formed, and the crop will then be the more plentiful; not only becauſe it will have attained its full growth, but likewiſe becauſe its leaves, being more ſubſtantial, diminiſh leſs in drying. It is not indeed, then quite ſo ſweet as before; but horſes eat it readily, becauſe they love to feel between their teeth the ſeeds, which now begin to be formed.

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Mr. Tull says this fodder is so excellent, that horses need no oats when they are fed with it. He affirms that he kept a team of horses with it a whole year in good plight, without giving them any oats, though they were worked hard all the time. He adds, that he fattened sheep with it, in less time than others which were fed with corn. But the hay of this plant can never be so good as when it is cultivated with the horse-hoe: for in the common husbandry, it blossoms almost as soon as it is out of the ground.

If the season continues rainy, it may be more advisable to let the saintfoin remain standing, than to run the hazard of having it rot upon the ground: for then the seed will ripen, and nearly make up for the loss of the fodder; not only because it will fetch a good price, but also because two bushels of it will go as far in feeding of horses, as three bushels of oats; and cattle in general, as well as poultry, are extremely fond of it.

The first of these sorts of saintfoin hay, cut before the bloom, is Mr. Tull's virgin hay, which, he says, is the best beyond comparison, and has not its equal, in the world, except lucerne. He gives the next place to the second sort, cut whilst in bloom, and says that an acre of land well cultivated, may yield three tons of this blossomed hay: and he esteems the third sort, which he calls the full grown, many degrees inferior to either of the former; though it yields a greater crop, because it has grown to its full bulk, and shrinks but little in drying.

Even the saintfoin that has yielded its seed, may be cut down and dried; and when other fodder is scarce, this will be better food for horses and large cattle, than the coarse hay of flowed meadows, or any kind of straw.

The manner of making saintfoin hay is thus directed by Mr. Duhamel.

In a day or two after the saintfoin has been mowed, it will be dry on the upper side, if the weather be good. The swarths, or mowed rows, should then be turned, not singly, but two and two together: for by thus turning them in pairs, double the space of ground is left betwixt pair and pair, and this needs but one raking, whereas, if the swarths were turned singly, that is, all the same way, the ground would require as much raking again.

As soon as both sides of the swarths are a little dry, they should be made up into small cocks, the same day they are turned, if possible: for when the saintfoin is in cock, a less part of it will be exposed to the injuries of night, than when it lies scattered upon the field. The sun and dew would exhaust almost all its juices, in this last case, in less than a week's time.

These little cocks of saintfoin may be safely made into large ones, without waiting for their being so thoroughly dry as those of common hay ought to be before they are laid together: because common hay, by sinking down closer, excludes the air necessary for keeping it sweet; so that if the weather prevents it being frequently stirred and opened, it will heat, turn yellow, and be spoiled; whereas saintfoin, by admitting the air more freely, because its stalks are less flexible, will remain much longer without any danger of fermenting.

Saintfoin hay is never better than when it has been dried by the wind only, without the assistance of the sun. A little rain, or a mist, which will turn common hay, clover, and even lucerne, black, will do no hurt to saintfoin, which is not really spoiled, till it rots upon the field.

If the weather threatens rain, and the saintfoin is not yet dry, it may be laid in cocks, without fear of its heating, provided a large basket, or bushy faggot, be set up in the middle of each cock, where it will serve for a vent-hole, through which the superfluous moisture of the hay will transpire.

As soon as all danger of its heating is over, these cocks should be made into ricks, and thatched. That which is laid up quite dry, will come out of the rick of a green colour: that which has heated much in the rick, will look brown.

It requires some experience to know at what degree of ripeness it is best to cut the seeded saintfoin; because all its seeds do not rippen at the same time. Some ears blossom before others; every ear begins blossoming at its lower part, and continues to blow gradually upward, for many days; so that before the flower is gone off at the top, the seeds are almost filled at the bottom. By this means, if the cutting be deferred till the top seeds are quite ripe, the lower, which are the best, would shed, and be lost. The best time, therefore, to cut it, is when the greatest part of the seed is well filled, the first blown ripe, and the last blown beginning to be full. The unripe seeds will ripen after cutting, and be, in all respects, as good as those that were ripe before. Some, for want of observing this, have suffered their saintfoin seed to stand till all of it has shed, and been lost in cutting.

Saintfoin should never be cut in the heat of the day, while the sun shines out; for then much, even of the unripe seed, will shed in mowing. The right time for this work, is the morning or the evening, when the dew has rendered the plants supple.

If the weather is fine and clear, the saintfoin will soon dry sufficiently in the swarths, without turning them; but if any rain has fallen, and there is a necessity for turning them, it should be done very gently, while they are moist, and not two swarths together, as in the other hay made of saintfoin before it has seeded. If the swarths are turned with the handle of the rake, it is best to raise up the ear-sides first, and let the stub-side rest on the ground in turning: but if it is done with the teeth of the rake, let the stub side be lifted up, and the ears rested on the earth.

If saintfoin be cocked at all, the sooner it is done, the better; because, if the swarths are dry, much of the seed will be lost in separating them; the ears being entangled together. When moist, the seed sticks fast in the ear; but when dry, it drops out with the least touch or shaking.

There are two ways of threshing it: the one in the field, the other in the barn. The first cannot be done but in very fine weather, and while the sun shines in the middle of the day. The best manner of performing this, is to have a large sheet pegged down to the ground, for two men to thresh on with their flails, while two others bring them fresh supplies in a smaller sheet, and two more clear away the hay that has been threshed. The seed is emptied out of the larger sheet, and riddled through a large sive, to separate it from the chaff and broken stalks; after which it is put into sacks, and carried into the barn to be winnowed. Care should be taken not to let the hay get wet, because it would then be spoiled.

A very important, and at the same time very difficult article, is the keeping of the seed that has been threshed.

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in the field, without having ever been wetted. If it be winnowed immediately, and only a little of it laid amidſt a great heap, or put into a ſack, it will ferment to ſuch a degree, in a few days, that the greateſt part of it will loſe its vegetative quality. During that fermentation, it will be very hot, and ſmell ſour. Spreading it upon a barn floor, though but ſeven or eight inches thick, will anſwer no end, unleſs it be frequently and regularly turned both day and night, until the heating is over: but even this will not make its colour keep ſo bright as that which is well houſed, well dried, and threſhed in the winter. This laſt, laid up unthreſhed, will keep without any danger of ſpoiling, becauſe it does not lie cloſe enough to heat. The beſt way to preſerve the ſeed threſhed in the field, is, to lay a layer of ſtraw upon a barn floor, and upon that a thin layer of ſeed, then another layer of ſtraw, and another layer of ſeed, and ſo on alternately. By this means the ſeed mixing with the ſtraw, will be kept cool, and come out in the ſpring with as green a colour as when it was put in.

The following method is followed in cultivating ſaintfoin in the Iſle of Thanet.

Though the lands in general here are very rich and fruitful, owing to the good tillage, and the quantity of manure they enjoy, yet at ſome diſtance from the ſea, they have land which is very barren and thin by nature; nevertheleſs, even this indifferent land they farm to the greateſt advantage. In theſe ſoils the farmers ſow ſaintfoin or French graſs with great ſucceſs, having ſometimes two loads of hay on an acre.

This graſs thrives beſt in theſe parts, on a thin coat of earth with a chalky bottom; it puſhes its long tap-root deep into the chalk, and extracts thence a nouriſhment, which is out of the reach of almoſt any other plant.

The land muſt always be exceedingly well prepared, before they attempt to put the ſeed in the ground; it has frequent plowings, and every the leaſt appearance of a weed or root of graſs is diligently picked off: graſs in particular is a very great enemy to this plant; without the utmoſt care it ſoon choaks and deſtroys it. They ſow this ſeed in April, either at the begining, middle, or latter end of the month, according to the ſeaſon: dry weather is beſt, provided it does not long continue: however, a little rain in theſe light ſoils does no great hurt. The quantity of ſeed they allow to an acre is five buſhels; of courſe it is ſown very thick. It does not lie any great length of time in the ground: when it is comes up, they carefully hoe and weed it to keep down the roguery and graſs: this puts the plants forward, and makes them ſo vigorous and ſtrong, that they will of themſelves keep down the graſs, eſpecially in theſe chalky bottoms, where graſs does not thrive well, and is not apt to coat land with turf.

Saintfoin uſed formerly to hold good in theſe parts for twenty years together, but it does not now of late years laſt ſo long: this is probably owing to their want of care in chuſing their ſeed, which ſurprizes me, conſidering what good farmers they in general are. They get, it is true, when they can, the beſt ſeed the iſland affords: but it would certainly be a much better way were they now and then to procure ſome of a finer growth from France: for it was from that country, as far as I can underſtand, it firſt came hither, about the latter end of Charles the Second's reign; and I do not hear from the inhabitants that they ever remember the importing any more ſince.

The climate of France is more natural to it; of courſe the ſeed comes to greater perfection there, whilſt, on the contrary, in England, that, as well as many other crops, is apt to degenerate after a certain number of years.

Where this crop takes, it is very advantageous to the farmer; it yields him for many years plenty of excellent fodder, and that upon land which would otherwiſe, perhaps, ſcarcely yield him any profit at all; and beſides all this, when the ſaintfoin begins to fail, if proper care is taken, the land when broke up will be found greatly refreſhed, and in a better condition to bear tillage and a ſucceſſion of other crops.

The farmers here, when they intend breaking up a ſaintfoin lay, feed it the laſt three or four years: mowing it at this time, they think, hurts and exhauſts the land too much; and beſides, the dung and urine of the cattle are of great ſervice.

They obſerve here, as well as in other places where ſaintfoin is cultivated, that after land has been once ſown with it, it will not for ſome years, to any advantage, bear ſaintfoin again. *Muſeum Ruſticum, vol.* I. *page* 109.

The reader is obliged to Mr. Holdway, an old experienced farmer at Marlborough in Wiltſhire, for the following account of cultivating ſaintfoin in that county.

"About one hundred years ago, ſays he, the culture of ſaintfoin was firſt introduced into Wiltſhire, and was ſoon preferred to clover graſs; and there was indeed ſome reaſon for this preference, for it thrives much better, and yields a much larger encreaſe, on poor hungry ſoils, than clover can do.

"Another very good reaſon may be aſſigned why ſaintfoin was ſo well received. The ſowing it at all was conſidered as a new huſbandry, and the timorous farmers were very unwilling to hazard the trial of any new method on lands which would any other way yield them any conſiderable advantage: it was chiefly in corners of fields, of very little uſe to the farmer, that this paſture was firſt tried, and that on poor lands, as, ſhould it not have ſucceeded, the only loſs would have been the ſeed; yet many occupiers of land would not, at firſt, hazard even this trifling loſs.

"But the ſentiments of theſe farmers were ſoon altered in this matter: clover wears out in a few years, whereas many, who ſowed ſaintfoin on poor land not worth above ſix ſhillings an acre, found their land ſo much improved as to be very ſpeedily worth thirty ſhillings the acre, and at the end of twenty years it continued yet in good proof.

"In fact, it will thrive, and be a very conſiderable improvement, on the pooreſt, and ſeemingly on the barreneſt land; but it muſt be remembered, that ſheer and ſlight ſands, and all clays, and other cold and wet ſoils, are to be excepted: on rich land the weeds ſoon deſtroy it. Beſides, as it ſends its roots very deep in ſearch of nouriſhment, the longer it occupies the land, the more good it does it; whereas this is far from being the caſe with ſhallow-rooting plants.

"A ſaintfoin lay may at any time be broke up, when it will be ſure to yield ſeveral good crops of corn, and may afterwards again with good ſucceſs be ſown with ſaintfoin; and one principle reaſon why it thrives ſo well on poor lands muſt be the length of the roots by which it is enabled to reſiſt the parching heat of the ſun better than moſt other graſſes are.

"One thing I muſt notify, which is, that I am by long experience

experience convinced that the land cannot be made too fine for ſaintfoin; it thrives the better for it, and is the more certain to take.

"I have often with very good ſucceſs, ſown it with oats and barley in the manner clover is ſown, the proportion much about equal to the grain it is ſown with; for as the ſeed of ſaintfoin is much larger and lighter than clover ſeed, of courſe a larger quantity ſhould be ſown: it is much beſt for the plants to come up thick; the ground is thereby ſooner ſtocked, and the weeds are eaſier kept under.

"Some in this county have ſown it in rows with intervals, to afford a better opportunity of deſtroying the weeds; and I have heard that on the tolerable rich land, apt to produce weeds, it has done very well in this way; but as I never experienced it, I ſhall not enlarge on that head.

"It is beſt not to feed it the firſt year; but whether it is ſown by itſelf, or with any other crop, it may be mowed the firſt year.

"It is much beſt, if a good crop is deſired, and it is to continue any time to the land, to ſow it in autumn by itſelf, the earlier the better; the proper ſeaſon is from the beginning of Auguſt to the end of September; but if you mix it with other grain, let it be ſown from the beginning of February to the end of March; the earlier in either ſeaſon, the better.

"I have, I think, before obſerved that the land cannot be made too fine for this plant; and it ſhould be well harrowed before ſowing, and again harrowed afterwards to cover the ſeed.

"I muſt once more repeat, that it muſt not be fed the firſt year; for the ſweetneſs of the graſs will cauſe the cattle to bite it too near the ground, which will greatly injure your crop: in fact, it is our practice not to let great cattle feed it till the third year, particularly in grounds that are inclinable to moiſture; for the roots are tender, and much treading is very injurious to it.

"When the ground is well covered, ſuppoſe in the third year after ſowing, if you intend to mow your ſaintfoin, it is beſt to lay it up by the middle of April at fartheſt: but it is better done three or four weeks ſooner. The time for cutting it is when it begins to flower, as it is then fulleſt of ſap: this will ſometimes be about the middle of May, but often later, according as the ſpring is cold or warm.

"In feeding it ſome neceſſary rules are to be obſerved. In the ſpring turn in your great cattle, and you may be pretty certain the buds will not be cropped too near. Oxen thrive well on it, without the danger, at their firſt grazing, that is to be apprehended from clover, &c. yet even this danger chiefly ariſes from the negligence or ignorance of the hinds.

"In the autumn, and part of the winter, you may feed your ſheep on it, which, if in health, will thereby be very ſuddenly fattened.

"Saintfoin hay is excellent food for horſes, and they are uncommonly fond of it.

"If you turn your cows in ſpring in your ſaintfoin lay, you will find it will breed in them abundance of milk; and all my acquaintance know that the butter made of it is excellent.

"When it is intended to ſave the ſeed of ſaintfoin, it is beſt to roll it in the ſpring, that the ſtones may be preſſed down, and the ſcythe go cloſe to the ground; or elſe the beſt ſeeds, which grow on the lowermoſt joints, will be loſt.

"When land is inclited to moiſture, ſaintfoin may thrive very well on it till a wet winter comes; but it is then a great chance if it is not deſtroyed.

"In this county it has long been the opinion of the ableſt farmers, that it is beſt not to dung our ſaintfoin: for the dung ſerves only to encourage weeds, and ſeldom reaches deep enough to give any ſupply of nouriſhment to the roots of the ſaintfoin.

"I have, if I miſtake not, before obſerved that the treading of great cattle, particularly in winter, is hurtful to this graſs: I would therefore by no means adviſe the farmer to fodder his cattle on it, as the field will thereby be poached full of holes, in which the wet lodging, it is a chance but the roots of the ſaintfoin are rotted by it.

"I have often fed my ſheep in winter with ſaintfoin hay; but whenever I intended this, I always cut my ſaintfoin ſome little time before it flowered: it is very eaſy to obſerve when the flower cup is forming: the ſheep will eat it very clean, and thrive well on it, provided it is not old and ſticky.

"When I ſay that ſheep in autumn will fatten very ſuddenly on ſaintfoin graſs, it muſt be obſerved, that I did not mean the aftermath of ſuch as had been mowed that ſeaſon; but the ſecond growth, when the field had been for ſome time ſhut up after the great cattle had fed it in the ſpring. The aftermath is, it is true, good for ſheep; but, I think, not quite ſo good as the aftermath of natural graſs; at leaſt, this I am certain of, that turn ſome ſheep into a field where there is a mixture of natural graſs and ſaintfoin, both of which have been mowed, they will to chuſe eat up the firſt, before they touch the other with any degree of appetite.

"Saintfoin ſhoots very early in the ſpring, and to nip it in the bud is very injurious; I would therefore adviſe that the ſheep be taken out about Chriſtmas, ſoon after which time it often begins to grow.

"Some of our Wiltſhire farmers have had a cuſtom of ſowing their ſaintfoin ſeed under furrow; but I do not much approve of this practice, though they ſay in light land it cannot be buried." *Muſeum Ruſticum, vol.* I. *page* 463.

The following method of cultivating ſaintfoin in Switzerland was written by an experienced huſbandman of that country.

"You have bought, you ſay, a little eſtate, at no great diſtance from the metropolis, and have thought of improving ſome of the lands by ſowing ſaintfoin: you requeſt me to let you know what are the methods in practice in this country relative to that graſs, as, when you left Switzerland to go to our uncle in London, you were too young to gain the neceſſary knowledge in farming. I ſhall oblige you with pleaſure, and the rather as I have had very good ſucceſs myſelf in this particular article.

"The roots of ſaintfoin, ſays he, penetrate very deep into the earth, by which means they do not exhauſt the ſurface ſo much as one would imagine, the vigour of the plant conſidered: the roots are perennial, and conſiſt of a white woody ſubſtance within, covered by a black outward coat or bark: from the crown of the root proceed ſeveral leaves, and ſome branches about two feet long, which incline on all ſides. Our fodder is furniſhed from theſe branches and leaves. Saintfoin is a very vigorous plant, and yields a moſt excellent fodder.

"It is not nice with reſpect to ſoil, but grows in almoſt any, if we except ſuch as are clayey, very damp, and low,

or ſtony: the crop is in proportion to the goodneſs of the land; but the ſaintfoin that grows on poor land, though leſs in quantity, is moſt nouriſhing and heartening for cattle: the virtues of it ſeem concentrated, and the cattle thrive much better on it than on ſuch as grows in greater quantities on rich mellow land.

"When we have it in our power to chuſe our ſituation and ſoil for ſaintfoin, we ought to prefer a light land, gently ſloping on the ſouth ſide of an eminence: here it proſpers to admiration.

"This plant does not thrive in the ſhade; for this reaſon we ſhould avoid having any trees in the fields that bear ſaintfoin: and it is ſubject to be ſometimes chilled, by having ſnow lie too long on it in winter; it ſhould not therefore be ſown on flat level land.

"To have a good crop, the land ſhould be properly prepared, by having two or three good plowings between harveſt and barley ſeed-time: the ſtones muſt be very carefully picked off the field; and it muſt be cleaned from all kinds of weeds, and other ſuch traſh.

"If it is likely that there will be a wet ſeaſon, the ſpring is the beſt time for ſowing ſaintfoin, as it will be much forwarder than that ſown in autumn: but if the ſpring is too dry, the ſowing will beſt be deferred till about Auguſt, as by that means the plants will have time to acquire ſtrength in their roots, and make vigorous ſhoots in the ſpring.

"The farmer may take it for granted, that if the ſoil will admit of it, he cannot well plow his land too deep, or make it too fine: he will reap all the benefit of it in his ſucceeding crops.

"In Switzerland we ſow it three times as thick as we do wheat; or, which amounts to the ſame thing, we uſe the ſame weight of ſeed, the ſaintfoin ſeed being ſo much ſmaller as to make that difference.

"Good ſeed ſhould be heavy, plump, bright, and of a yellowiſh red colour: if, on opening the pods, you find the ſeeds black and ſhrivelled, reject it as of no value; for it has been heated in the heap and will not grow: if it appears white and ſhrivelled, the plant was cut before the ſeed was ripe; from this you are to expect only ſtarved, meagre, ſhort-lived plants; you muſt therefore by no means ſow it. The pods incloſing good ſeed ſhould be plump, large, and armed on one ſide with ſmall prickles: and they ſhould alſo be of a deep brown colour: but it is beſt not to depend on the appearance of the pods, but open them, and examine the ſeed.

"The weather ſhould be mild at the time of ſowing the ſeed of ſaintfoin; and it ſhould be harrowed in, and not covered with above two inches of the earth at moſt: ſome ſow it in the ſpring with oats; but this I by no means approve of: it is much better ſown alone, eſpecially if you would have a ſtrong vigorous plant, that ſhall laſt for years.

"In our very poor lands in Switzerland we ſometimes purſue the following method.

"Immediately after harveſt we give the land intended for ſaintfoin a good deep plowing, laying it in high ridges; in this manner it is left to be mellowed by the froſt and ſnow; we take advantage of the firſt hard froſt to carry on our dung, and manure it well.

"When the froſt breaks in the ſpring, we ſpread the dung, and turn it in with the plow: we afterwards beſtow at leaſt two more plowings on the land, not only to keep down the weeds, but to make the land as fine as poſſible: in autumn we ſow wheat, and have reaſon to expect a tolerable good crop.

"When the wheat is got in, the land is again plowed, and left to meliorate and pulverize by the winter froſts: early in the ſpring it is plowed and laid level, the ſtones are all picked off, and the weeds cleared away: if rain is expected, it is now ſown pretty thick with the ſaintfoin, otherwiſe the ſowing is deferred till autumn. When poor land is managed in this manner, it will yield tolerable good crops of ſaintfoin for ſeveral years: it ſhould not, however, be fed the firſt year, as the treading of the cattle will deſtroy the crown of the plant, and prevent its ſhooting the ſucceeding year: and ſheep ſhould never be turned in to feed on it, as they will crop it ſo cloſe as to prevent its budding.

"Saintfoin comes up about a fortnight after ſowing it, and if the weather is moiſt, ſomething ſooner. When the plants are come up, they ſhould be ſet out at a proper diſtance with a hoe, that they may have room to ſpread. The young plants are very apt to be choaked by weeds; they muſt on that account be kept very clear of weeds; till, by their branches, ſtalks, and leaves, they cover the land; after which there will be no danger of the weeds getting a-head.

"As ſaintfoin ſeed is often faulty, it will not be amiſs to make a trial of it, by ſowing ſome of it in a detached bed of a garden, counting the ſeeds before they are put into the ground: by this means it may eaſily be known how many of them fail, and the quantity of ſeed to be ſown may be proportioned accordingly.

"Some have aſſerted, that ſaintfoin ſhould not be mowed the firſt year: but this is an ideal precaution; for in Switzerland we think it rather does it good than harm to mow it in autumn; and experience every day convinces us we are right in our opinion. The firſt crop is not, it is true, very large; but the mowing cauſes the plants to branch, and gives ſtrength to the roots.

"No cattle, as I ſaid before, ſhould be turned on ſaintfoin the firſt year: and indeed, it is beſt, if poſſible, always to mow it. We have three crops of green fodder or two of hay, from it, in one ſeaſon in this country.

"When we intend to ſave the ſaintfoin ſeed, we leave a part of it ſtanding, and do not cut it till we obſerve, by the colour of the pods, which will then be of a deep brown, that the principle part of the ſeed is ripe: we then either gather the heads by hand, or reap them with a ſickle, and lay them carefully on a cloth. The heads muſt be dried in layers three or four inches thick: if they were laid thicker, they would be apt to heat and ſpoil: when dry, we gently threſh them with ſticks; flails would be too heavy; for if the ſeed is the leaſt bruiſed, it does not come up. The ſtubble that remains after the heads are cut off may be mowed, and given either dry or green to the cattle; for though a little ſticky, they will not refuſe to eat it.

"I generally uſe my ſaintfoin green, foddering the cattle with it as ſoon as it is cut; and this I the rather do, becauſe the making it into hay is ſuch critical work: but when there is a likelihood of my being ſhort of winter-fodder, I have no choice to make.

"The weather ſhould be very fine when it is cut; for as it is full of ſap, it requires great heat to dry it; and if it happens to rain, it takes more damage than common graſs; and it is beſt not to cock it, as it is ſubject to heat in a very ſmall ſpace of time: if it is much wetted, it grows

grows black, and loſes all its ſweetneſs.

"Even when ſaintfoin is ſeemingly quite dry, it is apt to heat in the ſtack; but this is eaſily prevented by ſpreading alternately a layer of good oat or barley ſtraw, and another of ſaintfoin; when it comes to be uſed all together, it makes an excellent winter-fodder.

"Great care muſt be taken both in turning the ſwarths of ſaintfoin, and in loading it on the waggons, as a very little ſtirring will, when it is dry, ſhake off all the leaves; and this greatly leſſens its value: for this reaſon I make my men turn the ſwarths with the handles of their forkes, which is eaſily done; and I never cart it, but either early in a morning, or late in the evening, when it is ſomewhat moiſtened by the dews.

"Saintfoin is a very hardy plant, and bears, without being ſenſibly affected, the extremes of heat and cold; but the bottom of the land where it is ſown muſt not be wet, and there muſt be room for the roots to ſpread.

"A field of ſaintfoin on a good ſoil will laſt from ſixteen to twenty years in prime, and even longer, with care; for if, after ſeven or eight years, ſome well-rotted dung is laid on it, the future crops, as well as its duration, will be greatly increaſed. When it is ſown on light land, marling it is of very great ſervice.

"But if after all a piece of ſaintfoin falls off, our method is to plow it up in autumn as deep as poſſible; give it another plowing in ſpring, ſow it with oats, plow it again immediately after harveſt, dung it, ſow it with wheat; and when the wheat is off, plow it again, and giving it another plowing ſow ſaintfoin in it about the end of Auguſt; and this in general ſucceeds as well as that which was firſt ſown on the land.

"Before I conclude, I muſt give you a few cautions relative to this excellent fodder, which has of late ſo much improved this neighbourhood.

"It is ſo very ſweet, and cattle are ſo fond of it, that without great care they are apt to eat too much of it; whence often proceeds a ſurfeit, and ſometimes a corruption of the maſs of blood, and cutaneous eruptions: they ſhould at firſt have but a little at a time given them, that they may be by degrees habituated to it: by this management the danger vaniſhes.

"It is much more proper for ſlow draught-horſes than for ſuch as are uſed for berlins, or for riding; for it is apt to make horſes thick-winded, foggy, and ſomewhat ſluggiſh: for farmers horſes nothing can be better, or more nouriſhing; ſpeed is not required in them.

"When ſaintfoin is intended to be made into hay for horſes, it is beſt not to cut it till the ſeed is formed in the pod, as by that means the hay will be much more nouriſhing; and when the dried ſeed itſelf is plenty, nothing better can be given to the horſes by way of corn; for I can aſſure you from experience, that one buſhel of it will go as far as two of oats.

"When ſaintfoin is cut to be given green to cattle, it is beſt to mow it when it is in full bloom, as it is then moſt juicy, and fulleſt of ſap, and it will conſequently afford moſt nouriſhment to the cattle. The beſt way of managing it is to cut no more than will ſerve for the day; and by properly apportioning, or parcelling out the field, there will be, during the whole ſummer, ſome of it in order to cut for green fodder.

"If this green fodder is intended for ſheep, it may with great propriety be cut juſt before it flowers: the ſtalks are then in a tender ſtate, and very nouriſhing and good either for wethers or ewes. When it is to be made into hay for ſheep the ſame rule ſhould be obſerved.

"I have very little more to ſay on the ſubject of ſaintfoin, except that, as when a ſaintfoin lay is brought into tillage, it prepares land very well for wheat or rye, and bears good crops, there is ſeldom occaſion among the good farmers to try how long it will continue in heart, as they generally break up theſe lays in turn, and find it advantageous ſo to do. *Muſeum Ruſticum, vol.* I. *page* 37.

Experiments on Saintfoin.

The following judicious ſeries of experiments were communicated by a gentlemen of diſtinguiſhed rank and fortune in Yorkſhire.

"From an entire conviction, ſays this excellent huſbandman, that it is the duty of every ſubject to contribute all in his power to the good of ſociety, I have endeavoured, during ſeveral years that I have reſided in the country, to promote and encourage the advancement of agriculture. To this end I have made variety of experiments, on different ſoils, to prove and aſcertain the moſt beneficial methods of huſbandry, or how to employ land to the moſt advantage.

"A great part of my eſtate, conſiſting of waſte and uncultivated heath, which did not let for more than a ſhilling an acre, I judged it to be a matter of importance to try if it was not poſſible, by culture, or by applying this ground to a different purpoſe, to increaſe the value of it. Happy would it be, could pleaſure be made to coincide with profit! and it is certain, that whoever ſucceeds in the improvement of his own eſtate, may enjoy the inward ſatisfaction of rendering ſome ſervice to his country: for the example of a landlord may be thought to have ſome weight with his tenants; and if, amidſt a great number of experiments made for the ſake of truth, ſome have proved ſucceſsful, one may expect that the farmer will at laſt adopt a method which he has for many years ſeen repeated with advantage: for however the common farmer may have been accuſed of an obſtinate adherence to old cuſtoms, many inſtances might be produced of his quitting the paths of his anceſtors in favour of modern improvements; but then he muſt be thoroughly ſatisfied, that the new way is indeed preferable to the old, not in theory only, but in practice, confirmed by actual experiments often repeated before his eyes. And can we juſtly blame the illiterate peaſant for refuſing to forſake a method he is well acquainted with, and can depend on for the ſupport of himſelf and family, upon other terms? It is the province of the landlord to adopt a theory, and to try it by experiment; for if it fails, as is often the caſe, his ruin is by no means the conſequence, and the loſs is amply made up to him, by the ſecret pleaſure always accompanying a good intention. But whatever ſervice a gentleman may be of in encouraging reſearches of this nature, or by his influence in his own neighbourhood; yet ought his benevolence to extend farther, ſo as to be of uſe, if poſſible, to his country and mankind. It is the deſire of communicating the little knowledge I may have gained from the experience of a few years, that has prompted me to addreſs this letter to you, who are engaged in an uſeful and public undertaking: and you are at full liberty to make uſe of it, together with the detail of the experiments. They were begun without the leaſt deſign of making them public, and may therefore be deficient in point of method and order: but they are ſtrictly true.

"On the third of April, 1759, two acres of very ſandy land (which had a hundred loads of red marle laid on it the year before, and had borne a good crop of oats in 1758) were drilled with ſaintfoin, on four feet ridges in double rows, eleven inch partitions, the intervals three feet one inch wide, and took four pecks and a half of ſeed. This was intended to be horſe-hoed, as Tull directs; but the land was in ſuch bad tilth, and abounded ſo with the natural graſs, that, after once or twice attempting to deſtroy it, by plowing the intervals, the horſe-hoeing ſcheme was given up, and the ſaintfoin left to take its chance. However, a few plants remained thinly ſcattered in the rows (whether this thinneſs was owing to the badneſs of the ſeed, or to its being ſown too deep, I know not, though I rather impute it to the latter cauſe, as, in ſandy land, the ſhares of the drill are very apt to penetrate too far into the ground.) Theſe remaining plants flouriſhed exceedingly from the time of their being ſown; many were in flower the following June, and afforded a tolerable crop, viz. about a load. The after-eatage was very good. In 1760, theſe plants ſeemed to have arrived at their perfection, and the product was two waggon loads, or about two tons. In 1761, and 1762, this ſmall cloſe, having had ſome manure laid on it yearly, yielded nearly the ſame quantity of hay; and it is now let for forty ſhillings a year: a much higher rent than any land is let for in this neighbourhood, and four times the rent paid for it before the improvement.

The ſhares of the drill, as this gentleman obſerves, may be apt to penetrate too deep in light ſandy land, unleſs the driller is careful to regulate the depth, by the chain faſtened to the ſhafts, which ſhould have ſome ſmall links at one end of it, for that purpoſe;—The ſhares may be alſo prevented from going too deep, by a foot, or ſmall wheel, in the fore part of the drill plough. Or by putting a triangular piece of wood in the trunk of the ſhare, very thin at top, and gradually thicker downwards; this throws the ſeed at ſuch a diſtance behind the ſhare, that it falls into the channel made by the ſhare, after it is almoſt filled by the dry earth, and then the ſeed lies ſhallow, or is not covered with much earth, though the channels are made deep by the ſhares.—But in whatever manner the ſeed is covered ſhallow, it ſhould not be by making broad channels for the ſeed, as propoſed below, becauſe in that caſe the plants will come up in a broad row, which will not only obſtruct the hoing, but will alſo harbour weeds, which cannot be got out of a broad row as they may out of a narrow one; and for this reaſon the drill ſhares for all ſorts of ſeeds, ſhould be made as thin, and the channels as narrow as is conſiſtent with the neceſſary ſtrength of the ſhares. For ſowing wheat, ſainſoin, and other ſeeds about that ſize, ſhares of an inch thick, or ſomewhat leſs are ſufficient; and for turnips, cabbages, or ſeeds about that ſize, it is not neceſſary that the ſhares (ſo much of them as go in the ground) ſhould be above half an inch in thickneſs, or very little more.

"N. B. This cloſe of two acres was ſeparated from another of twenty-ſeven acres, of ſo ſandy and dry a nature, that, unleſs in a wet ſummer, the hay upon it was ſcarce ever worth mowing: and this experiment was made in order to determine what improvement the adjoining large cloſe was capable of, and to experience whether or no the common opinion, that ſaintfoin is improper for all ſandy and deep ſoils, be founded on truth, or only the reſult of prejudice: for the reaſon given for its diſagreeing with this kind of ſoil, did not appear to me ſatisfactory; and great part of my eſtate conſiſting of ſuch ſandy land, it ſeemed a matter of importance, to know, whether the great advantage derived from ſaintfoin, on ſome ſoils, might not alſo be applicable to ſandy ſoils.

"Encouraged by the flouriſhing condition of the ſaintfoin on this ſmall cloſe, I determined to extend the improvement to the larger one alſo, as ſoon as it could be brought into ſufficiently fine order to be laid down with this graſs. Accordingly, in the winter of 1759, twenty-five acres were plowed with the five coultered plough, as recommended by M. Duhamel, in his Treatiſe on the Cultivation of Land, in order thereby to prepare the ground for turnips the enſuing ſummer; for I look upon this as one of the beſt methods of deſtroying the natural graſs, and preparing the land for any of the artificial graſſes; eſpecially if the turnips are drilled in rows, and cultivated with the horſe-hoe. The land was plowed level in the ſpring of 1760, and into ridges of about five feet broad in June, and a ſingle row of turnips was drilled on the middle of each ridge in July. It is to be obſerved, that the natural graſs was far from being deſtroyed by theſe three plowings; nor could it be entirely ſo by the ſubſequent hoeings of the turnips; ſo that it certainly was a great prejudice to the ſaintfoin. The ſame ground is now ſown again with the ſame plant: but I would ſtrongly recommend to thoſe who are inclined to follow this method on ſuch a ſoil as I have deſcribed, to continue the culture of turnips, with the horſe-hoe, two years, inſtead of one: for by this means, the natural graſs and weeds may probably be effectually deſtroyed. But to return to the experiment: the turnips ſucceeded as well as could be expected on ſuch a ſoil, and without manure: they were eaten off by ſheep, and Scotch cattle, folded on the land.

"About four acres, on which the turnips were the firſt ſpent, were plowed level, and afterwards, viz. in November, drilled with ſaintfoin in equally diſtant rows, one foot aſunder. They took about a buſhel to an acre. This was an uncommon, and may be thought an improper ſeaſon for the ſowing of ſaintfoin: but I choſe to ſow part of the field before winter, and part in the ſpring, part with ſaintfoin mixed with corn, and part with ſaintfoin alone; in order to ſee which method would ſucceed beſt, that I might make it my guide in other places, more likely to yield good crops.

"Five or ſix acres of land were drilled in the beginning of April 1761, with ſaintfoin ſeed, in rows, at the ſame diſtance, and with the ſame proportion of ſeed, as the four acres ſpoken of before: about three acres were ſowed ſoon after with ſaintfoin and oats, both drilled: and about twelve acres were drilled with ſaintfoin and barley; each in rows, about a foot aſunder. The whole of this field, which contained twenty-five acres, had been plowed but once ſince the turnips; whereas two plowings might have been better: but, on account of eating them off with ſheep and cattle, there was not time for it.

"The three acres ſowed with oats in rows a foot aſunder, took four buſhels and a half of ſeed, and produced a very good crop; by computation, five quarters to an acre: but the exact quantity, neither of the oats, nor of the barley, could be known, on account of its being mixed in the

the barn with corn that grew in other places. The twelve acres ſowed with barley took ſeventeen buſhels of ſeed, and produced a much greater crop than any land in the neighbourhood; though this was a great year for barley. All the farmers who obſerved this crop, allowed that they had never ſeen finer barley; and it may be ſaid, without the leaſt exaggeration, to have yielded above five quarters to an acre. I am convinced that this computation of five quarters to an acre is a very moderate one; not only from the number of ſheaves, and the judgment of all who ſaw it, but likewiſe becauſe I had no more than twenty-ſix acres and an half of land drilled with barley this year; and the whole produce, when threſhed, amounted to one hundred and twenty-eight quarters and two buſhels; which is very near five quarters to an acre, taking one part with another: but theſe twelve acres bore by much the greateſt crop in proportion, and ſeven acres of the twenty-ſix were ſown on beds five feet broad, and horſe-hoed, which never produces ſo large a crop.

"The ſummer of 1762 was remarkably dry, and bad for graſs: many fields hereabouts, of ten acres, did not produce above a load or two of hay; but this of twenty-five acres produced twelve tons of good hay: which, conſidering that the ſaintfoin was not nearly arrived at its perfection, may be ſaid to be conſiderable.

"It was now eaſy to ſee in what parts of the field the ſaintfoin had ſucceeded beſt.

"The four acres ſowed before winter had the ſmalleſt number of plants of ſaintfoin of any; perhaps not more than one or two in ten yards: but this ground abounded ſo with natural graſs, that this alone furniſhed a tolerable crop. The five acres ſown in the ſpring, without corn, did not abound much leſs with natural graſs, or more with ſaintfoin, than the preceding: but there being a great mixture of the ſeeds of rye-graſs with all the ſaintfoin ſowed in the field, the rye-graſs appeared diſtinctly in tufts all along the rows; and, together with the natural graſs, ſeemed completely to have covered the ſurface of the ground. The rows were much better ſtocked with ſaintfoin plants in the twelve acres ſown with it and barley: but the rye-graſs abounded here likewiſe.

"It is remarkable, that the ſaintfoin flouriſhes beſt in thoſe parts of the field where the land is moſt barren; the reaſon of which undoubtedly is, that, as ſcarce any natural graſs, or weeds, ariſe to choak it there, its young and tender ſhoots have the benefit of the whole paſture, and its roots are not obſtructed in their progreſs by the growth of other plants.

"Though the greateſt part of this field is much underſtocked with ſaintfoin plants, yet it is in a very promiſing condition for a good crop of hay this year.

"I attribute the bad ſucceſs of the ſaintfoin on the firſt four acres, partly to its being ſowed too late, whereby the plants could not acquire much ſtrength before winter, which deſtroyed many of them; partly to ſome violent hurricanes of wind, which blew crouds of ſand from one part of the field to another, and overwhelmed many plants; and partly to the ſhares going too deep, by which the ſeed was covered at leaſt two inches. The bad condition of the five acres ſowed alone in the ſpring, I believe to be owing, in ſome meaſure, to the cauſes already aſſigned, and alſo to the want of protection and ſhelter from drought, which corn would have afforded in that very dry ſoil. Barley does alſo help to ſtifle the natural graſs, ſaintfoin's greateſt enemy. The ſaintfoin which was drilled with barley, looked, as was before obſerved, by much the beſt: but, indeed, ſome precautions were uſed to ſow the ſeed ſomewhat ſhallower on theſe twelve acres; and this may, in ſome degree, have contributed to its ſucceſs.

"Upon the whole, from the experiments made in this field (and ſeveral others made ſince have ſtrengthened my opinion on that head) I conclude, firſt, that ſaintfoin is very ſuitable to any ſandy or deep ſoils, provided they are dry, and that the natural graſs and weeds can by any means be completely deſtroyed: ſecondly, that it is better to ſow ſaintfoin in the ſpring, and with barley, than in the autumn, or ſpring, alone: thirdly, that the ſeed ſhould not be covered above an inch deep; but I believe half an inch the moſt proper depth. One foot may be a very proper diſtance for drilling the rows; and from a buſhel to a buſhel and an half, a proper allowance of ſeed for an acre of ground, provided that ſeed be good.

"I have tried the horſe-hoeing of ſaintfoin ſown on beds three or four feet broad; but, though the plants do by that means certainly grow more vigorous, I do not think the crop ſo great; and when the ſtalks are ſtrong and pipy, I have obſerved that cattle will not eat them.

Saintfoin and other plants grow large when well nouriſhed; for which reaſon, hoed ſaintfoin has larger ſtalks than the thick ſown: but the large ſaintfoin is not harder than the ſmall; on the contrary the large is more ſucculent, and richer food than the ſmall; the reaſon of this gentleman's cattle refuſing to eat his large, vigorous ſainfoin, was, becauſe it had ſtood too long before it was cut for them; and then it will grow hard and woody. It ſhould be cut when in full ſap, which is before it blows, or even before it begins to bloſſom, and then it is tender, full of rich juice, and very agreeable to cattle.

The ſowing in equally diſtant rows ſeems preferable, eſpecially where a large extent of ground is to be ſowed. But my experience is very inſufficient to decide this point abſolutely. I could wiſh that gentlemen would make trials of the horſe-hoeing of ſaintfoin in different ſoils and ſituations.

"Experiments carefully made, and often varied, by perſons void of prejudice, may, in time, decide that important queſtion in agriculture, viz. whether the common, or the horſe-hoeing, huſbandry be, upon the whole, moſt advantageous to the Engliſh farmer.

"If ſaintfoin be drilled on a ſandy ſoil, or on one that is in very fine order, the ſhares of the drill ought to be two inches thick, or they will go too deep; and a ſmall wodden roller ſhould be fixed to, and follow the drill, inſtead of a harrow with teeth, which would bring too much earth upon the ſeed. Such a roller will lay the ground ſmooth, and fitter for mowing. A ſpring made of three pieces of aſh, as deſcribed by M. Chateauvieux, is of great uſe, and may eaſily be added to Mr. Tull's drill plough. It may be faſtened underneath the middle of the plank, by four ſcrews, and made to preſs more or leſs on the roller, or harrow, which ever is made uſe of, by a wedge put in betwixt the ſpring and the hinder edge of the plank. If a harrow is uſed, iron teeth are much preferable to wooden ones.

"In the year 1757, I had a mind to try how much a ſoil naturally extremely bad, could be improved by art. Accordingly, I made choice of a piece of ground one acre and an half in extent, a barren ſand, which produced only a few miſerable weeds, and which the farmer who rented it did not think worth his while to cultivate. There hap-

pened to be a great quantity of red ſtony marle in an adjoining field, of which near three hundred loads were laid on this acre and an half. It was drilled with barley in 1758, and horſe-hoed: but the crop proved a very bad one. In 1759, a load of lime, and about ten loads of dung were laid thereon, and it was drilled with turnips and horſe-hoed: however, the crop ſtill was but moderate; though a good deal better than could have been expected from ſuch a ſoil. In 1760, it had turnips again, managed in the ſame manner as the former, but they were a great deal better. In 1761, it was drilled with oats, ſaintfoin and rye-graſs, mixed, in equally diſtant rows one foot aſunder. It took two buſhels and a peck of oats, and two buſhels of graſs ſeeds. The oats were very good, and produced four quarters and four buſhels. By continued horſe-hoeing three years together, the land was got into perfectly fine order, the marle and ſand were thoroughly incorporated, and the natural graſs and weeds intirely deſtroyed: ſo that the ſaintfoin and rye-graſs grew and flouriſhed exceedingly. In 1762, the ſummer being uncommonly dry, the produce was about half a load of hay; which was as much as one could expect the firſt year after ſowing. It is very well ſtocked with plants, which now, in May 1763, ſeem as vigorous as in any of my other fields, though I have ſome which yield two tons of hay to an acre. This litt'e piece of ground, which before was not worth a ſhilling a year, is, by the labour and coſt beſtowed on it, now worth at leaſt fifteen ſhillings an acre; which is a proof that, let land be ever ſo bad, it may be improved, and perhaps made equal to the beſt in the neighbourhood: but at the ſame time it muſt be confeſſed, that the expence is too great to be repeated at once on a large extent of ground. I calculate that three hundred loads of marle, dug and carried about three hundred yards, might coſt about four-pence a load, or five pounds for three hundred loads, which has been the whole expence attending this acre and half: for the manure, plowings, and horſe-hoeings, were repaid by the crops of barley, oats, and turnips."

Mr. Duhamel has mentioned the following experiments relative to the culture of ſaintfoin:

In 1754, M. Eyma, near Bourdeaux, planted ſaintfoin, lucern, and clover, in rows eight feet aſunder, with diſtances of ſixteen inches between the plants in the rows, which yielded him an immenſe increaſe. The alleys were horſe-hoed after each cutting.

In 1755, he planted a field, a little more than three roods ſquare, with ſaintfoin, which he cultivated according to the rules of the New Huſbandry; and this ſpot yielded him 10,000 pounds of dry hay. M. de Chateauvieux had 15,300 pounds of lucern, as we ſhall ſee, off ſomewhat more than an acre of ground, which he cut five times; but M. Eyma thinks that 14445 pounds, Geneva weight, of ſaintfoin, which he had at another time, at one cutting, is a greater crop than M. de Chateauvieux's lucern; beſides the after crop, which indeed was but inconſiderable, on account of the dryneſs of the ſeaſon. He ſays he cuts his ſaintfoin three times in good years, and that the two laſt cuttings produce nearly as much as the firſt: but he allows, that ſuch years are not to be expected often.

Mr. Young obſerves, that many have a notion, that cutting ſaintfoin twice in a ſummer is an injury to it, and make it bleed. But ſays, he has often cut his ſaintfoin twice, and three times, and once or twice he cut it four times in the ſeaſon, without perceiving it was at all hurt by it. If cutting it often does it any damage, it muſt be by cutting it too young; but when it arrives to ſuch maturity, as to come near bloſſoming, nature then points out the time to cut it, and it will then receive no more damage to cut it a ſecond or third time, than cutting it at firſt.

M. Eyma doubts whether the preference be due to ſaintfoin or to lucern: but he is confident that either of them, properly cultivated, will produce ſurprizing crops.

He thinks that one row of ſaintfoin, or lucern, planted in the middle of a bed three feet wide, will profit more by the different hoeings, and conſequently produce more graſs, than double or triple rows, though theſe laſt be planted on broarder beds; becauſe the ſingle rows have the earth looſened on each ſide of them.

M. Diancourt ſowed ſaintfoin, each plant of which, in 1753, had a head of two feet diameter. They throve ſo well, that, in 1755, one plant, and that not the largeſt in the field, yielded twenty-three ounces of hay.

The following inſtructions were given by an ingenious gentleman in Lincolnſhire.

"Mr. Tull ſays, that a deep ſoil is beſt for ſaintfoin. I believe every thing grows better, in a better ſoil: but by what I have ſeen of this plant, I ſhal always prefer for it a ſhallow ſoil, where there is a rock, or ſome hard ſubſtance, within ſix inches, or a foot, of the ſurface, to ſtop the roots of the plants, and make them ſpread horizontally. This has not only the good effects propoſed in M. de Chateauvieux's manner of tranſplanting lucern, but, it is ſaid, occaſions its filling the ground with more ſhoots by their ſtriking up from the knots of the roots. This fact I cannot verify: but certain it is, that, in ſuch ſoils as I here ſpeak of, a crop of ſaintfoin which at firſt appears very thin, will afterwards fill the ground perfectly well, and the plants of it will appear in much greater quantities than at firſt.

"I have ſeveral times broke off a root of ſaintfoin four or five inches within ground, and it always ſprang up again. This is a ſmall argument for the fact I mentioned.

"Saintfoin is much cultivated in Lincolnſhire. The common allowance of ſeed is five buſhels to an acre. A gentleman ſouth of Lincoln adviſed me always to ſow a ſmall quantity of trefoil with it (about four pounds on an acre). The reaſon is, that in this expoſed country, the young plants ſuffered more by the ſun in ſummer, than by the froſts in winter. Now the trefoil, coming to perfection the firſt year, and living only three, will be a ſhelter for the young plants, during the firſt year or two, and die off when the ſaintfoin wants its room. This ſyſtem is well ſupported by practice: but rye graſs ſhould on no account be ſowed with it; that being, when left for fodder, a great impoveriſher of ground.

"Saintfoin is obſerved to get to perfection in three years, laſts good four or five, and then dwindles during four or five more. Its firſt crops are from one or two loads; its ſecond ſtage, from three to four loads, and it dwindles down again to one.—Laſt ſummer, which was remarkably dry, did very well with this graſs.

"I have ſown ſaint'oin with barley, with wheat, without corn in the ſpring, and now" (this gentleman's letter is dated September 4th, 1763) "am ſowing ſome more at this preſent writing; but can form no judgment as yet.

"Three years ago I drilled ſome, according to Mr. Tull's Directions, in beds, with treble rows, and ſome at equi-

equi-distant rows. The horse-hoed beds were good, as far as they went: the others, drilled at a foot distance, gave so much room for weeds to come up, that the success was very moderate; which, indeed, would have been the case with the former, had not the horse-hoe cleared them. On the whole as far as my small experience and observations reach, I would never chuse any one to drill his seed, but to sow it in the broad cast-way, on land very fine, with a good quantity of seed."

SALLENDERS, a disease in horses, consisting in cracks in the bending of the hough, and occasion a lameness behind. This disease is cured in the same manner as the mallenders. *See* MALLENDERS.

SALT-MARSHES, pasture-lands lying near the sea, and sometimes overflowed by the sea-water.

"It has been observed, says an ingenious writer in the Museum Rusticum, that horses and black cattle thrive better, and get flesh and fat sooner, in salt marshes, than in fresh water meadows or upland pasture; yet I do not remember ever to have heard any good reason assigned for it.

"Some will tell you that the air of the sea whets their appetites: that the pasture is rich and nourishing; and that the herbs produced by the lands near the sea are more conducive to the health of herbaceous animals, than such as grow on upland pastures, whether natural or artificial.

"But may we not rather attribute the thriving of cattle on these marshes, to the saline particles with which the earth as well as its produce, is, when near the sea, strongly impregnated? Perhaps even the dews have their portion of salt; but of this I have made no experiment, therefore mention it only as a probable conjecture; for as they fall soon after they are exhaled from the sea, without passing through the secretions necessary to separate their saline parts, why should not this be the case?

"But to return to my first subject: I am fully of opinion, that the saline particles only, with which the grass is impregnated in the above-mentioned marshes, cause cattle to thrive in them in the manner they are known to do. These salts purge away the foul humours which the beasts have contracted, either by idleness, or by being overheated in labour; by which means they are better disposed to be nourished by the aliment they receive.

"It may, perhaps, be objected, that if the grass of these marshes is apt to purge cattle, this very purging, by being long continued, will be a means of preventing their growing fat. To this I answer, that the cattle take with their food every day nearly the same quantity of these purgative particles; but that the quantity of salt, which at their being first put into the marsh will have that effect, will cease producing it when they are, by custom, habituated to take a daily portion of it: this must be allowed, as we all know, that a few grains of rhubarb will operate as a cathartic to a person that is not accustomed to take it; yet it is as well known that a man may take many grains daily, if he uses himself to it, without its being sensibly purgative to him.

"It is not convenient to every one to send their cattle to a salt marsh: would it not, therefore, be happy, if we could substitute a method that would nearly answer the same purpose? I do not think this impossible: perhaps, if common salt water was to be laid in the fields for the horses to lick as often as they pleased, they would thrive much better; were I to say I know it would have that effect, it would be no presumption.

"Cattle are naturally fond of salt, and if left at their liberty, will take no more of it than what does them good. With this help, our fresh-water meadows, and upland natural and artificial pastures, would yield us a greater profit, and of course be worth more both to the land-owner and farmer.

"Some will not allow a thing to have merit, unless it is supported by what they call a proper authority; and they do not allow the experiments of a particular person to be sufficient. To satisfy such I can assure you, that in the inland parts of Switzerland, when their horses and cattle have endured the hardships of a long and severe winter, they turn them in the spring loose into the mountains, laying salt here and there upon the rocks, for them to resort to whom they please; and of this they are so fond, that when the farmers want to catch their horses, they take some salt in their hats, as we do oats in a sieve, to allure them.

"Experience has long convinced them, that the salt thus laid in their way answers every good purpose: their cattle are more healthy in general than ours are in England; and almost to this alone do they attribute it.

"In the province of Munster and Connaught, in Ireland, they very frequently lay salt on slates, for the benefit of their horses when at grass: this, they find, does the cattle great service; and in this should we imitate them, and not be too proud to learn of them, because in Ireland agriculture is not in so flourishing a state as in England.

"Some few farmers have (to do them justice) practised this method in our own country; but contenting themselves with the profit resulting from it, they have not propagated the knowledge of the many advantages they are sensible may be derived from this practice of giving salt to cattle.

"The farriers and horse-jockeys know well the use of salt; they mix it often in their medicines, and find, by experience, that nothing proves so powerful a stomachic to horses, as a little salt thrown into their oats.

"I must farther observe, that the use of salt is very proper when cattle are turned into clover, lucerne, or cole-seed to feed: it is well known, that, on these occasions, they are very apt, unless great care is taken, to be surfeited; the salt would prevent this accident, and thereby greatly accelerate the fattening of the cattle, and make it much safer to the farmer.

"Salt has also been found to be of great service in fattening hogs, by causing them to drink more plentifully than otherwise they would."

Lucerne cut green and given to horses, has the same effect upon them as a salt marsh. The lucerne at first, and for several days, is in a very high degree diuretic to them; after which they thrive upon it surprisingly, and in a very short time they get in high order.

For the uses of salt in rendering hay more grateful to cattle, *see the article* BRINING *of* HAY-RICKS.

SAND, a genus of fossils found in minute concretions, forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate shape, and appear regular, though more or less complete concretions; not to be dissolved or disunited, by water, or formed into a coherent mass by means of it, but retaining their figure in it; transparent, vitrifiable by extreme heat, and not soluble in, nor effervescing with acids.

These are subject to be variously blended and intermixed either

either with homogene, or heterogene particles, particularly with flakes of talc; and according to these, and their different colours, are to be subdivided into several kinds, as red, white, &c.

Dr. Lister divides the English sands into two classes; the first, sharp or rag sand, consisting of small transparent pebbles, naturally found on the mountains, and not calcinable: these he farther divides into fine and coarse, and subdivides each, according to the colours, into white, grey, reddish, brown, &c.

The second, soft or smooth, which he subdivides into that with flat particles broken from lime-stones, that with silver-like particles, and that with gold-like particles.

As to sand, its use is to make the clayey earth fertile, and fit to feed vegetables, &c. for earth alone, we find, is liable to coalesce, and gather into an hard coherent mass, as is apparent in clay: and earth thus embodied, and, as it were, glued together, is no-ways disposed to nourish vegetables: but if with such earth, sand, &c. i. e. hard crystals, which are not dissolvable in water, and still retain their figure, be intermixed, they will keep the pores of the earth open, and the earth itself loose and incompact, and by that means give room for the juices to ascend, and for plants to be nourished thereby.

Thus a vegetable, planted either in sand alone, or in a fat glebe, or earth alone, receives no growth or increment at all, but is either starved or suffocated; but mix the two, and the mass becomes fertile. In effect, by means of sand, the earth is rendered, in some manner, organical; pores and interstices being hereby maintained, something analogous to vessels, by which the juices may be conveyed, prepared, digested, circulated, and at length excerned, and thrown off into the roots of plants.

Grounds that are sandy and gravelly, easily admit both of heat and moisture; but then they are liable to these inconveniencies, that they let them pass too soon, and so contract no ligature, or else retain it too long, especially where there is a clay bottom; and by that means it either parches or chills too much, and produces nothing but moss, and cankerous infirmities; but if the sand happens to have a surface of good mould, and a bottom of gravel, or loose stone, though it do not hold the water, it may produce a forward sweet grass; and, though it may be subject to burn, yet it quickly recovers with the least rain.

Sea sand is accounted a very good compost for stiff ground; for it effects the two things following, viz. it makes way for the tree or seed to root in stiff ground, and makes a fume to feed it.

Sand indeed is apt to push the plants, that grow upon it, early in the spring, and makes them germinate near a month sooner than those that grow upon clay, because the salts in the sand are at full liberty to be raised, and put into motion, upon the least approach of the warmth of the sun; but then, as they are hasty, they are soon exhaled and lost.

It is remarkable that sand, tho' it appear a very hard, dense, and indissoluble body, yet is contained invisibly in the brine, or salt water of our salt springs; and even on the shooting of the salt, after evaporation, there still remain the particles of it in the clear pellucid salt; and this, though wholly soluble in water, yet when a brine, made by such a solution, is boiled, deposits as much of the sand as the common brine of the pits, or sea water.

Dr. Plot, who was very curious to know the true history of this singular effect, procured experiments to be made in the following manner: eight folds of fine holland, and as many of much finer cambric, were put together, and, a quantity of the brine of the Staffordshire salt pits being strained through this, there was nothing separated from it but a small quantity of black dust, which seemed to have fallen in by accident, and which was not at all like sand; yet, on evaporating this brine, it was found to contain no less than one fourth part as much sand as salt; the quantity of brine yielding a bushel of salt yielding also a peck of sand.

Some have supposed from these, and the like observations, that the sand was generated during the time of the boiling the liquor, but the more careful examiners think otherwise; it appearing to them, that the particles of this sand may be seen in the brine, by the help of a microscope, before the boiling, in form of rectangular oblong plates, some nearly square; these were so small, as readily to pass the strainer with the water; and appearing as numerous in it after, as before the straining, shew that they are no more to be kept, by such means, than the salt.

The pores of the finest strainers, examined by the microscope, appear twenty times bigger than these plates, or particles of the sand, and therefore it is not to be wondered at, that they let them through. There requires, therefore, no more to the formation of the sand, than the coalescing of several of these particles into one larger granule, and so on; and this is very likely to be done by means of the evaporation of a part of the fluid which kept them separate, and of the motion given to them in boiling, which naturally and necessarily brought them into the spheres of their own mutual attractions, at a time when their attraction with the fluid they swam in, was also much diminished with its quantity. This attraction seems even evidently to increase between the particles, as the water becomes evaporated, and, when finally the salt is drawn from it, and it is examined, as it drops from the baskets, in which the salt is put to drain, it is seen to contain more numerous particles of this sandy matter than before; and these are found to coalesce into yet larger concretions, by degrees, as the remainder of the fluid evaporates from them on the glass.

The particles of this stony matter, when once thus united, are no more to be separated by water, nor is the matter any longer soluble in that fluid. The common spar found in form of stalactites and incrustations on the roofs, walls, and floors of old caverns, shews that it was once dissolved in water, and by that means brought to those places, and made into those forms: and it should seem, that this sand, as it is called, was only this sort of spar, which is contained more or less in all water; and which, on the evaporating of that water and separation of the salt, which might help in making the water a menstruum proper for the retaining it, shoots out into its own natural concretions; for the figure of these thin plates is the true and natural thin parallelopiped or rhomboidal figure of the smaller concretions of that matter, and even of those pieces into which it falls on breaking. *Phil. Trans.* No. 145.

Common sand is a very good addition by way of manure to all sorts of clay lands; it warms them, and makes them more open and loose. The best sand for the farmers use is that which is washed by rains from roads, or hills, or that which is taken from the beds of rivers; the common sand that is dug in pits never answer nearly so well.

well. Sand mixed with dung is much better than laid on alone: and a very fine manure is made by covering the bottom of ſheep-folds with ſeveral loads of ſand every week, which are to be taken away, and laid on cold ſtiff lands, impergnated as they are with the dung and urine of the ſheep.

Beſides clay land there is another ſort of ground very improveable by ſand; this is that ſort of black foggy land on which buſhes and ſedge grow naturally, and which they cut into turf, in ſome places. Six hundred load of ſand being laid upon an acre of this land, according to the Cheſhire meaſure, which is near double the ſtatute acre, meliorate it ſo much, that without plowing, it will yield good crops of oats or tares, though before it would have produced ſcarce any thing. If after this crop is taken off, the land be well dunged, and laid down for graſs, it will yield a large crop of ſweet hay.

Once ſanding this land will improve it for a vaſt number of years, that it will yield two crops of hay in the year, if there be weather to make it in. Some land in Cheſhire has been, by this means, rendered of twelve times its former value to the owner. The bogs of Ireland, when drained, have been rendered very fruitful land, by mixing ſand in this manner among the earth, of which they conſiſt. Add to this, that in all theſe boggy lands, the burning them, or firing their own turf upon them, is alſo a great advantage. The common peat, or turf aſhes, mixed with the ſand for theſe purpoſes, add greatly to its virtue.

Sea ſand, which is thrown up in creeks and other places, is by much the richeſt of all ſand for manuring the earth, partly its ſaltneſs, and partly the fat and unctuous filth that is mixed among it, give it this great virtue. In the weſtern parts of England, that lie upon the ſea coaſts, they make very great advantages of it. The fragments of ſea-ſhells alſo, which are always in great abundance in this ſand, add to its virtues; and it is always the more eſteemed by the farmers, the more of theſe fragments there are among it.

The ſea ſand uſed as manure in different parts of the kingdom is of three kinds: that about Plymouth, and on other of the ſouthern coaſts, is of a blue grey colour like aſhes, which is probably owing to the ſhells of muſcles, and other fiſh of that or the like colour, being broken and mixed upon it in great quantity. Weſtward, near the land's end, the ſea ſand is very white, and about the iſles of Scilly it is very gliſtering, with ſmall particles of talc; on the coaſts of the north ſea the ſand is yellowiſh, brown, or reddiſh, and contains ſo great a quantity of fragments of cockle ſhells, that it ſeems to be chiefly compoſed of them. That ſea ſand is accounted beſt, which is of a reddiſh colour: the next in value to this is the bluiſh, and the white is the worſt of all.

Sea ſand is beſt when taken up from under the water, or from ſand banks, which are covered by every tide.

The ſmall-grained ſand is the moſt ſudden in its operation, and is therefore beſt for the tenant who is only to take three or four crops; but the coarſe or large-grained ſand is much better for the landlord, as the good it does laſts many years.

Where ſand is dredged out of the ſea, it is uſually twice as dear as where it is taken from the ſand banks.

When the land has been well manured with the large ſand, they take four crops of corn from it, and then lay it down for paſture for ſix or ſeven years before they plow it again. The graſs is ſo good, that they commonly mow it for hay the firſt year; it always abounds very much with the white-flowered clover. If the graſs grows but ſhort, it is the farmer's intereſt to feed his cattle upon it, and it will turn to as good account this way, being very ſweet and rich, and making the cattle fat, and the cows yield a very large quantity of milk. *Mortimer's Huſbandry.*

SAND-*Flood*, a terrible diſaſter incident to the lands of Suffolk, and ſome other parts of England, which are frequently covered with vaſt quantities of ſand, rolling upon them like a deluge of water, from ſandy hills in their neighbourhood.

Violent winds break through the turf that covers theſe hills, and then the ſand, lying looſe and naked, is ſoon carried down upon the plains, where it covers and buries the graſs, and in a very little time eats through the light turf, and mixing itſelf with the ſand underneath, becomes one bed of this dry matter never to be covered with turf again. A large body of ſand being thus got together, nothing ſtops its progreſs; but it, at every ſtorm, rolls over more and more ground, ſo that in a few years it extends itſelf a vaſt way, eſpecially where the ground, over which it paſſes, is of the ſame ſandy nature, and only covered with a thin turf.

In ſome parts of Suffolk the ground encourages this change ſo greatly, that a bed of ſand broke looſe from a neighbouring hill, and covering only a few acres, perhaps eight or ten, will, before it has travelled four miles forward, which it does in a ſmall courſe of years, deluge a thouſand acres. It travels down hill faſter than any way elſe, but will not be ſtopped by aſcent, but will move up the ſteepeſt hill, only that it requires more time. The making of fences, in the common way, to keep it out, is vain. It runs through the hedges, and flies over the tops of the banks; and when it reaches a village, in it courſe, will bury the cottages, unleſs preſerved at more charge than they are worth. It will in a very little time beat up to the eaves of a houſe, of the low kind, that are uſually built in a country village, and has often weight enough to break down walls in its paſſage.

The beſt way of ſtopping its progreſs is by hedges of furze, planted one over the other, as they become levelled; theſe, if well kept up, will, by degrees, ſtop or divert the progreſs; and ſome who have tried this, with reſolution, after they have had the ſand raiſed twenty feet high, have found it ſtop its increaſe, and then, having manured this adventious ſoil with dung, found it as good ground as that which made the ſurface before.

About Thetford, the villages were wholly deſtroyed by this about ninety years ago, and the branch of the river Ouſe, called then Thetford river, ſo blocked up by it, that very ſmall veſſels only could go up it, where very large ones uſed before. The river has been of great ſervice in ſtopping its progreſs into Norfolk, where otherwiſe its courſe would have carried it, and its vaſt ſpreading ſideways, in proportion to its going forward, would have made it bury vaſt quantities of land in a few years.

The moſt probable conjecture, as to the cauſe of this ſtrange ſort of deluge in theſe parts of England, is, that this portion of the country of Suffolk lies eaſt north eaſt of a part of the great level of the fens, and is by this expoſed to very impetuous winds which acquire more than ordinary force by their paſſing through ſo large a

tract

tract of country uninterrupted; the ſtorms ſeem to be one great cauſe of the miſchief, and the ſandy nature of the ſoil the other. There are old ſtories, in the country, of ſuits at law commenced among the farmers, for grounds blown out of the owners poſſeſſion; but the people who gain this ſort of wandering land are the greateſt ſufferers. A little ſand ſprinkled by the winds over a tract of land, where there is a bed of ſand under the turf, ſoon eats through that obſtacle; and what was at firſt only a thin coat of ſand, becomes then a deep plain of it, capable of being blown away to the depth of eight, ten, twenty, or more feet, and is carried over every thing in its progreſs before the winds, when once taken up by them. *Philoſophical Tranſactions*, N°. 37.

SAND-*lands*, *or Sandy lands*, a term uſed by our farmers to expreſs ſuch grounds as conſiſt wholly of a pure ſheer ſand.

This is of different colours, as white, blackiſh, reddiſh, or yelloviſh, and is very different in its nature, and in the ſize of its particles, ſome being harſher and ſome milder, and ſome very light, ſeeming only to be mere duſt. The grey, black, and aſh-coloured ſand-land are the worſt of all, and generally are found on heaths and commons. Gravelly lands approach much to the nature of theſe, and thoſe which conſiſt of the largeſt ſtones, and are mixed with the harſheſt ſands, are of all the moſt barren.

The propereſt plants for arable land, of this kind, are white oats, rye, buck wheat, and turneps. The natural produce, in weeds, is quick graſs, ſorrel, broom, furze, fern and heath.

The beſt manure for them is either marl, or ſuch clay as will break with the froſts. Cow dung is alſo a good manure for theſe lands, and many uſe with ſucceſs chalk, mud, and the half rotten ſtraw from dung-hills.

When the farmer has a mind to raiſe corn on theſe lands, he muſt order them the ſame as they do the clays; but where they are over-run with broom, furzes, and ſuch ſort of weeds, marle is to be laid on in great quantities. This is the practice in Staffordſhire, and by it they rid themſelves of theſe troubleſome weeds, and procure good crops of corn, though at ſome expence.

The firſt ſowing of this land is with buck wheat, and for this they make three fallowings in winter, and ſtir them in the May following; at this time they ſow them, allowing one buſhel of ſeed to an acre, which generally yields them ſixty again. Then once plowing theſe lands, after this crop is off, they are fit to ſow rye on.

In Oxfordſhire, they ſeldom give theſe lands more than two fallowings for wheat, except they are very much over-run with weeds; and they eſteem the white and Lammas wheat the moſt agreeable for this ſort of land, and then after a fallow rathripe barley. They afterwards generally fallow them every other year, and reckon them unfit for beans and peas, though they ſometimes ſow them with winter vetches. If they ſow peas on them, they eſteem the rathripe kinds the beſt.

In Herefordſhire, they are much ſubject to moſs growing upon their ſandy lands, and they make a great improvement by burning it on the ground, and mixing the aſhes with lime, which they plow in.

They generally ſow them with rye after this manure, and that yields a very great increaſe upon them, and brings on a very good kind of graſs, if they are laid down after a crop or two. *Mortimer's Huſbandry.*

SAP, a juice furniſhed by the earth, and changed in to the plant, conſiſting of foſſil, ſaline, aerial, and other particles from putrefied animals, vegetables, &c.

This juice enters the plant in form of a fine and ſubtile water; which the nearer it is to the root, the more it retains of its proper nature; and, the farther from the root, the more action it has ſuſtained, and the nearer it aproaches to the nature of the vegetable.

Conſequently, when the juice enters the root, the bark whereof is furniſhed with excretory veſſels, fitted to diſcharge the excrementitious part, it is earthy, watery, poor, acid, and ſcarce oleaginous at all.

In the trunk and branches it is further prepared, though it ſtill continues acid; as we ſee by tapping or perforating of a tree in the month of February, when it diſtils a watery juice apparently acid.

The juice being here carried to the germs or buds is more concocted; and here, having unfolded the leaves, theſe come to ſerve as lungs for the circulation and further preparation of the juice.

For theſe tender leaves, being expoſed to the alternate action of heat and cold, moiſt nights, and hot ſcorching days, are alternately expanded and contracted, and the more on account of their reticular texture.

By ſuch means is the juice ſtill further altered and digeſted, as it is further in the petala or leaves of the flowers which tranſmit the juice, now brought to a further ſubtility, to the ſtamina: theſe communicate it to the farina or duſt in the apices, which is, as it were, the male ſeed of the plant, where having undergone a further maturation, it is ſhed into the piſtil, which performs the office of an uterus or womb; and thus, having acquired its laſt perfection, it gives riſe to a new fruit or plaint.

The root or part whereby vegetables are connected to their matrix, and by which they receive their nutritious juice, conſiſts of an infinite number of vaſa abſorbentia, which being diſperſed through the interſtices of the earth, attract or imbibe the juices of the ſame: conſequently, every thing in the earth that is diſſoluble in water, is liable to be imbibed; as air, ſalt, oil, fumes of minerals, metal, &c. and of theſe do plants really conſiſt.

Theſe juices are drawn from the earth very crude; but by the ſtructure and fabric of the plant, and the various veſſels they are ſtrained through, become changed, further elaborated, ſecreted, and aſſimilated to the ſubſtance of the plant.

SCAB, a diſeaſe incident to ſheep, chiefly occaſioned by a tedious length of wet weather.

"I imagine, ſays Mr. Veſey, your readers will not be diſpleaſed if I ſhould, with your aſſiſtance, communicate to them a remedy for this diſorder, which I have ſeveral times tried, and almoſt always found to anſwer extremely well.

"Some men, whom I have known to breed and feed a great number of ſheep, have been groſly miſtaken in their comprehenſion of the nature of this diſtemper, which they raſhly judged to be merely cutaneous; whereas, when a ſheep has the ſcab, the blood is always more or leſs affected by it: therefore the outward applications, which are in general alone reſorted to for a cure, do for the

the moſt part more hurt than good, by driving in the eruption, and making it fix on the internals, thereby often occaſioning the death of the animal.

" Now the true way to treat this diſorder is, firſt to give the animal ſomething inwardly to drive out the eruption; then comes, with propriety, the outward application, which completes the cure by killing the ſcab.

" When a farmer has any of his flock afflicted with the ſcab, let him attend to the directions which follow.

" Take a gallon of ſoft well or pond water, which divide into two equal parts: in one of theſe parts diſſolve eight ounces of old hard ſoap; to which when it is diſſolved, add two ounces of ſpirits of hartſhorn, and ſeven ounces of common ſalt, with four ounces of roll brimſtone, beat to a fine powder and ſifted: then take the other part of the water, in which put two ounces of tobacco leaf, and one of white hellebore root: boil this ſecond part till you have a ſtrong infuſion, after which ſtrain it clear from the leaves and roots.

" When you have got thus far in the proceſs, take that part of the water, firſt mentioned, and ſet it over the fire; let it boil for about half an hour, keeping it continually ſtirring with a wooden ladle during that time: in the mean time heat again the other part, in which the tobacco and hellebore were infuſed; and when it is hot, mix the two parts gradually together over the fire, keeping the mixture continually ſtirring till it is taken off the fire, which ſhould be in about a quarter of an hour: when it is quite cold, let it be put into a ſtone bottle, in order to its being kept in a cool place for uſe.

" Then take four quarts of new ale or beer: put into it twelve ounces of common ſalt, two ounces of bay ſalt, and eight ounces of pounded nitre, together with twelve ounces of pounded roll brimſtone: ſet them over a gentle fire, and when the ale boils, take off the ſcum; let it boil for about half an hour; after which ſet it by till it is cold, and put it into a ſtone bottle for uſe.

" When you are ſo far prepared, take one quart of ale, ſet it on the fire; mix into it by degrees, three ounces of flour of brimſtone; when it is juſt ready to boil take it off the fire, and let it ſtand to cool; and when it is only blood-warm, give this quantity inwardly to three ſheep, which is to be repeated every ſecond day till they have had three doſes. This will drive out the diſorder, when the firſt mixture is to be rubbed on the diſtempered parts: and two days afterwards the ſecond, and ſo alternately for about eight or ten days, till the cure is effected: ſometimes two rubbings will be ſufficient.

" I muſt obſerve, that all theſe mixtures will be beſt boiled in well glazed earthen or iron pots." *Muſeum Ruſticum, vol.* II. *page* 173.

" The two greateſt enemies the ſheep, ſays another ingenious gentleman, or at leaſt their wool (which is the moſt valuable part of them) have, are the ſcab and fly. I believe they deſtroy more wool than all the other diſeaſes incident to that animal.

" Mr. Veſey has given us an approved remedy for the ſcab, and at the ſame time enters ſomewhat into the nature of that diſtemper. For my own part, I have not preſumption enough to look into firſt cauſes; ſecondary ones are all I aim at: I always took nature to be a wiſe inſtructor, and the ſureſt guide; but if we will hobble out of the way ourſelves, ſhe is not to blame.

" I agree with Mr. Veſey, that in this, and every other diſtemper a ſheep labours under, the blood is more or leſs affected and diſturbed; which diſturbance, if I am not miſtaken, the faculty call a fever; therefore it muſt be always conſidered, that a fever is no more than a ſtruggle of nature to get rid of ſome enemy in the blood, by throwing it out by ſome of the outlets of the body, namely by ſweat, urine, or ſtool; or upon the ſurface of the ſkin; and then ſhe ſeems to ſay, I have thrown the diſtemper out to your view, and there deſtroy it by proper applications.

" It ſurely is no ſcab until it is thrown out upon the ſkin; and when it is thrown out, what avails it giving internal remedies, to do that which nature has done before? If it be out, there's your ailment; and I think, gentlemen, it is an axiom in phyſic, that when a diſtemper is once known, it is half cured: if it is only coming out, my advice would be, not to diſturb nature, who is always acting for our good, in a wiſer and better manner than we can do ourſelves: ſhe ſometimes indeed is too weak for her office, and ſometimes too ſtrong; in the one caſe ſhe is to be properly aſſiſted, and in the other, prudently reſtrained; and when we do more or leſs, the effects are generally fatal. I hope this will ſatisfy Mr. Veſey, that he is not altogether in the right, any more than his neighbours.

" To cure an illneſs with a few medicines, is as commendable, as to ſay a great deal in a few words. One great obſtacle to Mr. Veſey's treatment of ſheep with ſcab, is its being too compound, troubleſome, and laborious, ſetting aſide the expence; and, where there are a great number of ſheep, hardly to be practiſed. I would have all remedies for the ailments of ſheep be as ſimple as poſſible; and to be obtained and prepared with as little trouble; for certain I am, gentlemen, when it is otherwiſe, many will let their flocks go neglected, or at beſt leave them to a ſlovenly ſhepherd, who knows very little of the matter; and when clip-day comes, when the poor creatures are out of their wool, (if they had any on before) what a ſight preſents itſelf to view! moſt parts of their ſkins being one continued ſcab, and other parts eat quite through, and deep into the fleſh, by the maggot: this I have ſeen at clip-day, and may ſpeak it; but what muſt I alledge it was owing to? Sorry am I to ſay, to the over credulity of the maſter, who thought he had a ſhepherd who knew every thing; but the event proved the contrary.

" You muſt not be ſurpriſed when I ſay, what will deſtroy the fly, will alſo cure the ſcab, with little or no alterations: mercury is a mortal foe to both; and the remedy for the fly is as follows.

" Take of good corroſive ſublimate, half an ounce; diſſolve it in two quarts of rain water; to which add a gill of ſpirits of turpentine: this is the whole of it, which muſt be uſed in the following manner.

" When the ſheep is ſtruck, the ſhepherd muſt make a circle round the maggots with ſome of the water, by dropping it out of a bottle: this prevents them getting away, for they will not come near the water: then he muſt ſhred or open the wool within the circle, and drop a few drops of the water amongſt them, and rub them about with his finger, and there leave them, for they will all die preſently.

I ſpeak this from my own certain knowledge, and many others in this part of the country (Iſle of Ely) can do the ſame.

"To a quart of the above water I add a pint of the ſimple lime-water of the London Diſpenſatory; and I declare it from experience, there is no more certain cure for the ſcab than it: I am ſure it is the cleaneſt, the ſooneſt prepared, and when ſo, the cheapeſt; which are inducements, I think, ſufficient to have every countryman make uſe of it." *Muſeum Ruſticum, vol.* II. *page* 369.

SCRATCHES, a diſtemper incident to the heels of horſes.

It has ſo much affinity with the greaſe, and is ſo often a concomitant of that diſeaſe, that the method of curing the ſcratches may be ſelected from that article.

The parts affected ſhould be firſt covered with the linſeed and turnip poultice, having a little common turpentine added to relax the veſſels; the green ointment may then be applied to promote the diſcharge, when the ſcratches may be dried up with the ointments and waſhes recommended in that article. *See* GREASE.

It is beſt afterwards to keep the heels ſupple, and ſoftened with curriers dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preſervative as it is to leather; and by uſing it often before exerciſe, will prevent the ſcratches, if care is taken to waſh the heels with warm water, when the horſe comes in. When they prove obſtinate, and the ſores are deep, uſe the following; but if any cavities or hollow places are formed, they ſhould firſt be laid open, for no foundation can be laid for healing, till you can dreſs to the bottom.

Take Venice turpentine four ounces, quickſilver one ounce; incorporate well together by rubbing ſome time, and then add honey and ſheeps ſuet, of each two ounces.

Anoint with this once or twice a day; and if the horſe is full or fleſhy, you muſt bleed and purge; and if the blood is in a bad ſtate, the alteratives muſt be given to rectify it. *Bartlet's Farriery, page* 294.

SCYTHE, SITHE, *or* SYTHE, the inſtrument uſed in mowing, being a crooked blade joined at right-angles to a long pole. *See the article* MOWING.

SEAGRIM. *See* RAGWORT.

SEAM, tallow, greaſe, hogs-lard.

SEAM *of Corn*, a quarter, or eight buſhels.

SEAM *of Wood*, a horſe load of wood.

SEAR, dry; oppoſed to green: ſpoken of wood.

SEARCHER, *See the article* BORER.

SEAVES, ruſhes.

SEAVY *Ground*, ground over-run with ruſhes.

SEED, the product of a plant, whereby the ſpecies is propagated.

The choice of the ſeed intended to be ſowed is an object of greater importance than many farmers ſeem to imagine. It is not ſufficient that the fineſt grains be choſen for this purpoſe, unleſs they are likewiſe very clean. Such wheat is not difficult to be had from land cultivated according to the principles of the New Huſbandry; but we ſeldom find corn intirely free from ſeeds of weeds when it has been raiſed in the common way.

It is natural to ſuppoſe, that the grains of ſtinted and ſickly corn neceſſarily partake of the weakly diſpoſition of the plant which produced them, and that their productions cannot be ſo fine as thoſe which grow from the ſeeds of ſtrong and healthy plants. For this reaſon Mr. Tull adviſes to take the ſeed corn from a richer ſoil than that in which it is to be ſowed, and rather from ground in perfect tilth, than from land which has been leſs carefully cultivated. This ſeems to be very right (though the contrary opinion is almoſt generally received), becauſe more may reaſonably be expected from the productions of a fine good ſeed, which are full of vigour and well conditioned, than from a poor weak plant.

M. de Chateauvieux, who often ſowed with no other intention than merely to try, for the benefit of mankind, at what time, in what manner, and in what condition it is beſt to ſow wheat, found that this corn ſprouted pretty well even when ſowed ſo green that it had not yet loſt its milky quality; but thinks it much more adviſable to ſow none but what is thoroughly ripe; becauſe the ſeed has then attained its full perfection, from whence we may moſt certainly expect the beſt and ſtrongeſt plants.

"The wheat, ſays he, which has been reaped in a warm dry year, ſeems to me fitter for ſowing, than that which has been gathered in a cold wet ſeaſon: for in ſuch a time as this laſt, all the productions of the earth are leſs good; their taſte is leſs ſavory; and as that corn in particular in which there is moſt moiſture, is moſt difficult to keep, I infer from thence that the formation of its grain muſt be leſs perfect. I ſhould therefore prefer wheat a year old, provided the year it was gathered in was warm and dry, to that which may have juſt been gathered in too rainy a ſeaſon: for the ſame reaſon, I always chooſe for ſowing, wheat of the growth of my high grounds, rather than that which has been produced in flats. The benefit accruing from all this care, may, perhaps, not be extremely great: but at the ſame time it does not coſt any thing. Let us do in agriculture what is done in all manufactures, where the very ſmalleſt profits, the very leaſt ſavings, are not neglected. Thoſe ſmall articles, often repeated, make large ſums in the long run, and are a real gain.

"Another thing, of greater conſequence, firſt made known to me by chance, but ſince confirmed by repeated experiments, always attended with the ſame ſucceſs, I ſtrongly recommended as extremely ſerviceable to the firſt ſprouting of the ſeed. In my experimental ſowings, I commonly uſed wheat taken from the heap in the granary; and likewiſe, frequently, corn picked out of the ears the moment before I ſowed it. I counted exactly the grains of both ſorts, and ſuppoſe that few will think there could be any difference in their productions. Yet I found a conſiderable one. What was picked out of the ears always roſe extremely well; ſcarce a grain of it ever miſſed; whereas numbers of thoſe which were taken from the heap, never ſprouted at all. I did not perceive this difference at firſt; but at laſt it ſtruck me. I relate the fact as it is, without pretending to account for the cauſe of this difference, which would lead me into too long a digreſſion. The experiment itſelf may be of real uſe, by ſhewing us, that inſtead of threſhing the wheat intended for ſeed at any time, without diſtinction, it ought not to be threſhed till a very few days, at moſt two or three, before it is ſowed. A few hands will be able to ſupply the ſeeds-men with as much as they will want: nor will this method, which may be a means of ſaving ſomewhat in the ſeed, be attended with any extraordinary expence.

"Perhaps

« Perhaps too this practice may be attended with a very valuable advantage. I have not indeed yet made the trials neceſſary to ſatisfy myſelf of what I imagine; but my deſire to be of ſervice to the public induces me to mention it, that the lovers of agriculture may reflect upon it, and try ſuch experiments as will clear up my conjectures.

« Threſhing the ſeed only juſt before it is ſowed may poſſibly, in ſome meaſure, or perhaps intirely, prevent the cauſe of ſmut in wheat. By this I mean, that the ſeed which has not been mixed with ſmutty corn, or any way infected by its black powder, will be exempt from that diſtemper. Not that I take black powder to be abſolutely the original cauſe of this diſtemper in corn; but I believe it is very capable of communicating it to grains which are ſound.

« That nothing may be neglected which can be of any ſervice to the ſeed, great care ought to be taken in threſhing the corn, eſpecially in the manner that buſineſs is commonly performed, with flails, upon the barn floor: for a great number of grains are frequently ſo much bruiſed thereby, that it is impoſſible they ſhould ever grow. If the wheat thus threſhed for ſeed is not thoroughly dry and hard, the miſchief is ſtill greater; much more of it being then abſolutely cruſhed by the flail.

« As ſowing in drills requires leſs ſeed than is uſed in the common method, it will be eaſier to execute there an operation which might be too long and troubleſome for ſo great a quantity as is uſed in the old way. The method which I adviſe, and which I have practiſed, is this. Let one or two beams, two feet and a half, or three feet thick, be laid a-croſs the barn floor; let the threſhers ſtand on each ſide of the beam, and take out of looſe ſheafs of wheat, one of which ſhould be placed behind every man, a handful at a time, and give it two or three ſtrokes againſt the beam. This will bring out a great deal of grain, which is to be reſerved for ſeed. The ears thus ſhaken may be bundled up again, and afterwards threſhed out with the flail, for other uſes. This method is not ſo tedious as ſome may imagine: we are ſure that not a grain is bruiſed; and thoſe are the moſt perfect which drop out thus. I think I may compare this operation with what is done in the making of wine, where the firſt running is always the higheſt flavoured and beſt.

Another excellent way to ſeparate the fulleſt, and conſequently heavieſt grains, which are undoubtedly the fitteſt for ſeed, from thoſe which are of leſs value for that purpoſe, and at the ſame time to clear them from many ſeeds of weeds, is, to make a ſtout man, with a broad wooden ſhovel, throw the corn with all his force towards an oppoſite corner of the barn, or rather of a large boarded hall, which generally is the fitteſt for this work. All the light, ſmall, ſhrivelled grain, unfit for ſowing, and the ſeeds of cockle, darnel, &c. not being ſo heavy as the ſound ſolid corn, will fall ſhort, and lie neareſt to the man who throws them; while ſuch as are large, plump, and weighty, out flying all the reſt, are ſeparated widely, and may eaſily be gathered up. Experience will ſhew the vaſt advantages of ſowing ſeed thus choſen.

The uſe of ſteeps was introduced very early into huſbandry, not only as a means of preſerving corn from ſeveral diſtempers to which it is ſubject, but alſo with a view to render the ſeed more fruitful. That ſome of them have ſometimes anſwered the former of theſe intentions is undeniable: but with regard to the latter, much ſtronger and oftener repeated evidences than any that have yet been produced, are ſtill wanted to confirm their boaſted efficacy. I ſhall however, give a conciſe account of ſome of the moſt famous of both kinds; with this previous obſervation, that even ſuch of them as have not ſucceeded in ſome caſes, through cauſes perhaps unknown to us, may poſſibly do well in others, when tried with proper judgment and attention. Experiments of this kind ſhould by all means be continued on a double account; firſt, to take off a prejudice which ſeems to gain ground, though it be not founded on any rational principle; and next to be well aſſured whether theſe preparations do, or do not produce any ſenſible effect. Experiments ſeldom prove uſeleſs to careful and accurate obſervers. If they do not always anſwer the end propoſed, they at leaſt ſometimes lead the way to other important diſcoveries.

The Romans had their lees of oil, decoction of cypreſs leaves, juice of houſe-leek, &c. on which they have beſtowed full as much commendation as they merit. Lord Bacon ſeems to have been the firſt who paid any attention to this ſubject in England: but he has only pointed out the path to others: nor do I know any author who has yet given us a ſet of experiments with this view, long enough continued abſolutely to determine what effects ſome kind of ſteeps may have towards rendering grain more fruitful.

Van Helmont, and, ſince him, the authors of the Maiſons Ruſtiques, having given many receipts for ſteeps, which they vaunt exceedingly, as increaſing the fruitfulneſs of the ſeed ſteeped in them. But at the ſame time that they recommend theſe receipts, they adviſe ſowing the corn thinner than uſual; generally one third leſs; a circumſtance which, alone, will add greatly to the crop, as very many experiments, and particularly all the good trials of the new huſbandry, have evidently demonſtrated. That the compariſon may be juſt, all circumſtances ſhould be alike, as to the goodneſs of the ſoil, the quantity and quality of the ſeed, &c.

M. Duhamel, to ſatisfy himſelf whether any benefit does ariſe from the uſe of ſteeps, by way of giving the ſeed a greater degree of fruitfulneſs, tried the following experiment. He infuſed ſome good wheat in a lye of dung, mixed with lixivial ſalts, nitre, and ſal ammoniac, and ſowed with this grain two beds in his kitchen garden, dug with a ſpade. One of the beds was ſowed very thick, and the other very thin. At the ſame time he ſowed two other beds, exactly like the former, with ſome of the ſame ſeed, not ſteeped, one thick, and the other thin. At harveſt time the beds ſowed with the ſteeped ſeed were ſo exactly like the others, that it was impoſſible for the eye to diſtinguiſh between them.

A gentleman in his neighbourhood followed exactly the directions given in the Maiſons Ruſtiques, in the uſe of one of their boaſted receipts, which is there ſaid to be of ſuch efficacy, that the land need be plowed but once for wheat prepared with it. He did ſo; and his crop was ſcarce worth reaping.

On the other hand, M. Duhamel mentions his being informed by M. Peirol, many years ſecretary to the intendant of Auvergne, that he had made ſeveral experi-

ments in imitation of thoſe mentioned in the abbé de Vallemont's famous book. In the month of May 1755, he planted in his garden (an indifferent ſoil, in a hot expoſition,) four ſmall cabbages, which then had only four leaves. In September following, the ſame cabbages were ſix feet and a half in circumference. Some plants of red wheat, tranſplanted into a bed dug very fine in his garden, bore one hundred and thirty ears a piece, each of which contained from forty to eighty grains. Some plants of white wheat, tranſplanted at the ſame time, produced an hundred and twenty ears, each of which had from thirty to forty grains. Two grains of red wheat, ſowed in the ſame bed, and not tranſplanted, produced each of them one hundred and forty ears, which contained ſix thouſand grains. Five plants of red wheat, diſtant from one another ſix inches, did not branch ſo well, being too cloſe together: but each of them produced from forty to fifty ears, which contained from forty to ſixty grains. Rye, which branches leſs than wheat, produced from thirty to thirty-five ears, each containing from ſixty to ſeventy grains: and the barley of that country, which branches but little, produced however from ſixty to eighty ſtalks, though the ſeed of this laſt had not been ſteeped in any liquor before it was ſowed.

The author of theſe experiments judiciouſly obſerves, that they muſt be repeated and varied, before it can be made to appear that the extraordinary increaſe is owing the ſteep.

This celebrated liquor of the abbé de Vallemont is made as follows.

Put into a tub, expoſed to the ſouth, one buſhel of horſe-dung, the ſame quantity of cow-dung, half a buſhel of pigeon's dung, as much ſheep's-dung, as much aſhes, three gallons of ſmall pricked wine, two pounds of ſalt petre, and as much water as will ſufficiently dilute the whole, ſo as to make it thin enough for uſe. Every time that any of this liquor is taken out to ſprinkle the plants, it is filled up again with water; and as it may be too ſtrong at firſt, it may be weakened accordingly.

It is eſſential to obſerve, that M. Peyrol added to this infuſion frequent digging; for the ground was dug five times between the plants of wheat: and he obſerved that each digging ſenſibly gave freſh vigour to the plants, which grew to the height of ſix feet.

M. Donat, another of M. Duhamel's judicious correſpondents, made trials of theſe mixtures, from the uſe of which ſo much is promiſed: but ſays he thinks them of no other ſervice, than to amuſe the curious, who do not regret expence. As the authors of them boaſt that all kinds of ſoils, whether good, bad, or indifferent, well or ill plowed, reſted or not reſted, will produce ten times more than in the common way; this gentleman ſowed a large extent of ground, ſome good, ſome bad, ſome well, and ſome ill plowed, &c. He made the ſteep himſelf, was preſent when the ſeed was ſowed, and took care that no circumſtance was neglected. But notwithſtanding all his care, his crop was far from anſwering their promiſes. The good, well cultivated ſoil, produced fine wheat; but not extraordinary in point of quantity. The only advantage was in the ſaving of the ſeed. The poor ill cultivated land, and that which had not been reſted, produced very little grain: and the very bad ſoil, none at all. Theſe experiments convinced M. Donat, that the ſureſt means of obtaining good crops, is, to have the ground in good condition. This is the principle on which the New Huſbandry is founded: nor indeed does it offer any thing marvellous, or contrary to the moſt ancient precepts of good huſbandry.

If there be in any of theſe ſteeps, or preparations, a more than common virtue, by which the grain infuſed in them is rendered more prolific than it would otherwiſe be, poſſibly ſome ſuch benefit may accrue from the following practice, which is recommended by the author of the New Syſtem of Agriculture.

"Take, ſays he, the corn which is intended for ſowing, and throw it, by a buſhel at a time, into a large veſſel full of water; let a man ſtir it with a ſtaff, as violently as he can, for a conſiderable while together, and then giving it a little time to ſettle, ſkim off all that ſwims upon the ſurface: repeat this till no more riſes; then take out the corn which has ſunk to the bottom, and lay it by for ſeed; proceeding in the ſame manner till you have your intended quantity. After this, make a brine of bay-ſalt and rain-water, ſtrong enough to bear an egg. Steep the ſeed corn in this liquor during thirty hours; for leſs time will not have any effect: then take it out, ſpread it upon a ſmooth floor, ſtrew over it a good quantity of fine-ground powder of ſlaked lime, and ſweep the whole up and down till each grain leaves clinging to another, and becomes, as it were, perfectly candied with the lime. It is then fit for ſowing; and will infallibly produce a very abundant crop." Some farmers vary this ſteep, by adding to it a mixture of pigeons, or other dung; and in moſt parts of France, where this receipt is known, they omit the ſalt; perhaps becauſe it is too dear in that country, and ſteep the wheat in lime-water. For this purpoſe they put it into baſkets, and carefully ſkim off all that ſwims on the top, moſt of which would not ſprout, and is only fit to feed fowls.

The ſociety of improvers in the knowledge of agriculture in Scotland, call the following a very promiſing receipt for multiplying corn: but as no experiment that we know of, duly attended to, has yet confirmed that ſurmiſe, we can only ſay, that it may not be wrong to give it ſuch farther trials as will not hurt the experimenter, whether they do or do not ſucceed: a rule which ſhould be conſtantly obſerved in all experiments.

"Take as much water as will fully cover the quantity of grain you intend to uſe; add thereto a reaſonable quantity of a mixture of horſe, cow, and ſuch other dung as you can conveniently get, ſo as not to make the water too thick: add likewiſe for every boll (four buſhels) you are to ſteep, about a peck or a ſixteenth part of the ſame ſort of grain as you are to ſteep. Boil all theſe till the grain is reduced to a pulp; keeping the kettle or cauldron cloſe covered, to retain the ſteam. When the boiling is over, pour off the water, and diſſolve in it a pound of nitre, or ſalt petre, to every four buſhels of corn: then, while it is luke-warm, infuſe your corn for three days, after which, drain off the water, ſpread the grain on the floor, mix it with a ſufficient quantity of ſea-ſand, (if ſuch can be conveniently had), and laſtly, with lime, to dry it, as is uſually done in other caſes."

"It ſeems reaſonable to think," ſay the abovementioned ſociety, "that nothing can be more natural for impregnating grain, than the ſtrength and eſſence of itſelf. But, ſince nitre is added, it is beſt to be cautious; for it has been found by experience, that ſalts, though they have the virtues mentioned, kill or deſtroy the vegetative pow-

ers,

ers, when the application is immoderate, either with reſpect to the quantity, or the time the grain is ſteeped; ſo that there has often been a neceſſity to ſow over again with the ſame, or ſome other grain. To make the better judgment concerning this critical affair, the nature and condition of different grains are carefully to be conſidered; but the moſt certain knowledge and direction are to be obtained by a courſe of obſervations and experience. Mean while, it is beſt to obſerve the maxim, avoid extremes."

In Mr. Houghton's collection of papers relative to huſbandry and trade, are ſeveral experiments on the ſteeping of wheat and barley in a liquor which is there ſaid to have occaſioned a very great increaſe, and is thus made." "Take a quantity of rain-water, and diſſolve in every gallon of it two pounds of ſtone-lime: let it ſtand two or three days, ſtirring it three times a day: then pour off the water into another veſſel, and add to every gallon of it about four ounces of ſalt-petre, and one pound of pigeons dung: mix them well together, by ſtirring them three or four times a day, and then ſtrain off the liquor to keep for uſe." Mr. Everard, who communicated this receipt to Mr. Houghton, ſteeped a handful of wheat in a quart of this liquor, where he let it infuſe eighteen hours: he then took it out, and laid it to dry in the air for the ſpace of one day; and then ſteeped it again in the ſame liquor for about twelve hours, dried it as before, and ſteeped it again a third time, about ſix hours, after which he planted it in his garden, which was but common earth, ſetting it by ſingle grains, about ten inches aſunder, and a finger's length in depth. He could not remember whether every grain ſprouted, but thought that very few failed. Thoſe which did grow, produced an extraordinary increaſe, ſeveral of them yielding from ſixty to ſeventy, ſome of them eighty ſtalks with very large ears full of fine plump corn: many of the ears were ſix inches long, and contained ſixty grains: none had leſs than forty.

He alſo ſteeped peas and beans in the ſame liquor; but could not ſay whether their having been ſteeped too long was the cauſe that none of them came up: but he took the thick ſediment which remained after the liquor was ſtrained off, mixed it with four times the quantity of earth, let it lie all winter in a gravel walk, ſouth of a codlin hedge, then made a row of holes, about four inches diſtant, put a handful of the mixed earth into each hole, with a pea upon it, and covered it with common mould. The peas ſprouted well, ran up the codling hedge to the height of about nine feet, ſhot out branches in ſeveral places, like vines, and bore ſo many well filled pods, that he judged he had above a buſhel from about three or fourſcore ſeeds.

He tried alſo an experiment on wheat infuſed in lime-water alone, ſome in brandy alone, and ſome in brandy and lime-water mixed, and had a great increaſe from each grain. With ſome of the liquor made with ſalt-petre, lime, and pigeons dung, he watered ſeveral trees in his garden, and found them grow and flouriſh much faſter than any other of the ſame kind which were not watered in that manner. He alſo ſteeped barley in the ſame liquor, and found its increaſe equal to that of wheat.

Whether there be, or be not, any kind of prolific efficacy in theſe, or any other ſteeps, of which great numbers are pompouſly recommended, and which proper experiments can beſt determine; they are at leaſt ſo far ſerviceable to the ſeed corn, that they clear it from filth, from many ſeeds of weeds, and from ſuch poor light and diſtempered grains as are not fit for ſowing, and prepare it in ſuch a manner, that, being already well moiſtened, it will ſhift much better than abſolutely dry grain, in caſe a drought ſhould enſue after it is ſowed.

This thorough cleanſing of the ſeed may probably be, in a great meaſure, the reaſon why corn ſo prepared is leaſt apt to produce ſmutty ears. All the lyes generally made uſe of, certainly preſerve the plants from mouldineſs, and that in which lime is a principal ingredient ſeems to be one of the moſt effectual. But as this part naturally leads to the diſtempers of corn, another very intricate, but highly intereſting ſubject, we ſhall reſume it under that head, to which it properly belongs; and give in the mean time M. Duhamel's farther opinion concerning the pretended prolific virtues of infuſions, with ſome late experiments relative thereto, as delivered in the ſixth volume of his excellent Treatiſe on the Culture of Land, publiſhed laſt year.

We liſten readily to the marvellous, eſpecially when it promiſes any great and ſingular advantage. Such was the abbe de Vallemont's prolific liquor, by means of which the huſbandman was to reap vaſt crops, without manuring, or ſcarcely plowing his land. He was only to ſoak his ſeed in this admirable liquid, which was to open, ſtrengthen, and amazingly fertilize the germ. Improbable as this doctrine is, it was greedily received.—It is known, that a ſeed contains in that part of it which is called the germ or bud, the embryo of a plant, that is to ſay, a plant in miniature, and that the reſt of the ſeed ſerves to feed the young plant, or plantule, till it acquires roots which draw its farther nouriſhment from the earth. As ſoon as theſe roots ſpread, the ſeed is exhauſted, and there remains only its then uſeleſs huſk. What benefit then can be derived from prolific liquors? Perhaps they may render the nutritive ſubſtance of the ſeed fitter to ſupport the young plant, which in conſequence thereof, may appear ſomewhat more vigorous at firſt, and till it has ſtruck out roots: but from the time of its producing thoſe roots, it ceaſes to ſubſiſt upon the lobes of the ſeed. Can it be imagined that a ſingle atom of any prolific liquor exiſts at the diſtance of four or ſix inches from the plants in the earth, where its roots are ſpread, and from whence they draw their ſubſiſtance? Yet, ſuch is the fondneſs of men for projects of this kind, de Vallemont's mixture was extolled as a wonderful diſcovery, indued with a magnetic virtue capable of attracting from the boſom of the air certain principles, which probably do not exiſt in it, and numbers of receipts have been deviſed for making prolific liquors. Writers upon agriculture have ſtuffed their books with them, and vaunted their miraculous effects. A deſire to ſee theſe mighty promiſes fulfilled, paved the way for their reception, and ill made experiments have given a ſanction to the error.

A little corn, impregnated with theſe pretended prolific liquors, has been planted grain by grain in a garden, and its extraordinary increaſe has immediately been imputed to the ſteep. I myſelf was deceived by ſuch trials: but when I extended them to three or four acres of ground, this great fertility no longer took place, and I began to doubt the efficacy of theſe boaſted ſpecifics. About the ſame time, I ſaw a ſingle grain of barley produce 230 ſtalks, without any preparation, and was informed by the Rev. Dr. Hales, that another grain of barley had in like manner, produced one hundred and fifty-four ears. From hence

hence I concluded, that the prodigies of vegetation ſo much vaunted by ſome writers, as the effect of their favourite infuſions, have in fact been owing to the nature of the ſoil, to good culture, and to the grains being at ſuch diſtances from each other, that their roots have had room to ſpread, and thereby collect a great quantity of food. I then had recourſe to new experiments, which confirmed me in this opinion.

We ſee in the Political State of England, that a grain of wheat which grew by chance on a bed of onions and had not received any preparation, produced 5600 grains. Upon which the author of that work remarks (as Indeed I had done before in regard to the former of the above-mentioned productions) that we muſt not from thence infer that the country where ſuch a thing happens is naturally more fertile than another, or the method of agriculture commonly practiſed in it better than elſewhere; for that the cauſe of theſe prodigious growths is, that the grains ſtand ſingle and in a good ſoil; that the only conſequence which can be drawn from thence, is that the New Huſbandry comes neareſt to that ſtate in which theſe ſurpriſing growths are produced; that it certainly muſt increaſe the product of the crops; and that it will probably require leſs ſeed than is uſed in the common way.

Though it was pretty well proved by our experiments, that good culture and proper manures contribute more effectually to the increaſe of crops, than all the boaſted prolific liquors; yet ſeveral perſons, out of zeal for the public good, have publiſhed, ſome the advantages which they think ariſe from the uſe of certain fertilizing ſteeps, and others, receipts for making them.

In this ſpirit, M. de la Jutais has given us a little tract entitled, The true Philoſopher's Stone, according to which, an admirable prolific liquor is to be thus made. Fuſe ſome nitre in an iron veſſel; and when it is hot enough to burn the ſubſtances which are to be added, throw in a ſmall quantity of the ſame kind of ſeed as you intend to ſow: for example, if you would have a prolific liquor for wheat, throw a little wheat upon the nitre; if turnips, put in turnip ſeed, and ſo on. Theſe ſeeds take fire, are conſumed, and incorporate with the melted nitre. Your prolific liquor is then made, and you have only to mix the nitre with water. What reſults from this operation? Nothing more, than that there is in this prolific liquor a great deal of nitre with a ſmall portion of fixed nitre, or alkaline ſalt: whether this nitre be mixed with wheat, barley, turnip ſeed, or powder of coal, all chymiſts allow that the reſult will be the ſame, and that the ſame liquor might be made by mixing a little alkaline ſalt with a ſtrong ſolution of ſalt-petre. The queſtion is, what effect it will have upon vegetables. To try this fairly, two exactly ſimilar fields ſhould be ſowed, the one with wheat prepared with the prolific elixir, and the other with wheat only limed in the uſual way; taking care to ſow an equal quantity in each field: for the ſingle circumſtance of diminiſhing the quantity of the ſeed, may increaſe the crops in years when the corn does not tiller much, and in good ſoils. Many have been deceived by not attending to this circumſtance. The following are well made experiments.

"M. Delu, after trying M. de la Jutais's eſſence three times, with the moſt ſcrupulous care and exactneſs, thinks it of no ſort of ſervice.

"M. Peirol, whom I mentioned before, communicated to me in 1755, ſeveral experiments which he had made with great care, in order to ſatisfy himſelf whether theſe prolific liquors have any virtue; and thoſe trials made him then hope for ſucceſs. I thanked him for his obliging letters, and exhorted him to repeat the ſame experiments with ſome new precautions which I thought important. He did ſo, with all poſſible care; and it is with real pleaſure that I ſhall give a juſt account of them, becauſe they ſeem to me extremely fit to diſſuade thoſe who wiſh well to agriculture, from putting their truſt in ſuch illuſions. Inſtead of running after an empty ſhadow, they may employ their time in uſeful perquiſitions, by which the public will be benefited.

"M. Peirol ſowed, both in his own garden, and in that of the intendant of Auvergne, 1. many-eared wheat; 2. rath-ripe barley; 3. the common red wheat of the country; and had from each of them an amazing increaſe.

"Each plant of the many-eared wheat, had from fifty to ninety-two ſtalks, and theſe laſt yielded 13800 grains.

"Some of the rath-ripe barley had two hundred and forty-four ſtalks to each plant, and yielded 14640 grains.

"Several plants of the red wheat had three hundred ſtalks; but the grains were eaten by birds.

"Theſe were fine productions: but the moſt important thing to be obſerved here, is that M. Peirol ſowed all theſe different kinds of grain, as well in his own garden, as in that of the intendant, on the ſame day, viz. the 8th of September 1756; part of this corn having been ſteeped in the abbé de Vallemont's fertilizing liquor, while the reſt had not been infuſed at all: yet their productions were quite alike; the ground had been prepared exactly in the ſame manner for the ſteeped and the un-ſteeped grain, and both were equally watered from time to time with that prolific waſh. This laſt circumſtance ſpoils the whole experiment: for who can doubt but that this watering of the plants with impregnations of dung, muſt give them great vigour; even more than a conſiderable quantity of dung itſelf would have done? However, the following experiment is, luckily, without that fault.

"On the 4th of April 1755, M. Peirol divided a pretty large field into five equal parts. The ground was in good tilth, and he ſowed it with barley.

"The firſt part was ſowed with unſteeped barley in rows a foot aſunder.

"The ſecond was ſowed with the ſame kind of barley ſteeped in de Vallemont's liquor, and likewiſe in rows a foot aſunder. Both had a plowing between the rows, towards the end of April.

"The third was ſowed in broad-caſt according to the cuſtom of the country, excepting that a quarter part of the uſual quantity of ſeed was retrenched: but ſtill it was the ſame ſort of barley, and this had been ſteeped in de Vallemont's liquor.

"The fourth diviſion was alſo ſowed in broad-caſt, like the former; with this only difference, that the ſeed was ſteeped in a prolific liquor invented by M. Robineau.

"Laſtly, the fifth part was ſowed intirely in the common way, with the uſual quantity of the ſame kind of ſeed, un-ſteeped.

"The following was the ſtate of theſe five diviſions at harveſt time.

"The firſt and ſecond, which had been ſowed in rows, with only a quarter part of the quantity of ſeed generally uſed in the common way, but prepared for the one by being

ing infuſed in de Vallemont's liquor, and ſowed in the other without any impregnation, were both very fine, and yielded a great deal of grain.

"The third and fourth, which had been ſowed in broad caſt, with an abatement of only a quarter part of the uſual quantity of ſeed, and where the grain for one had been ſteeped in de Vallemont's liquor, and that for the other in M. Robineau's, were middling, and not viſibly different in any reſpect.

"The fifth ſpot, which had been ſowed intirely in the common way, and with the uſual quantity of ſeed, was the worſt of all.

"Though M. Peirol was prejudiced in favour of prolific eſſences, he nevertheleſs concludes from this experiment, 1. That the un-ſteeped grain uſed for the firſt mentioned portion of the field, having yielded as fine a crop as that of the ſecond which was ſteeped, infuſing the ſeed does not contribute much to make the plants tiller.

"2. That the products of the third and fourth diviſions being quite alike, M. Robineau's ſteep is not better than de Vallemont's.

"3. That the difference between the crop of the fifth, and thoſe of the third and fourth pieces of ground, was probably owing to the different quantity of ſeed.

"4 That the ſuperior beauty of the firſt and ſecond, which ſurpaſſed all the reſt, was occaſioned by the grains being ſo far diſtant from each other, that the roots of the plants had ſufficient room to collect their food, and that the huſbandman was enabled to ſtir the ground between the rows, in the ſpring, by which the vigour of the plants was conſiderably increaſed. All this confirms the advantages of the New Huſbandry; and M. Peirol is ſo convinced of it, that he has ſowed a very large tract of land, near Riom, in the ſame manner as the two firſt parts of the above-mentioned experiment.

"He has likewiſe made another trial of de Vallemont's ſpecific, by planting vines in two different places. In one of theſe, where the ſoil was good, the common practice was followed, and the cuttings ſprouted ſoon: in the other, where the ground was leſs good, each cutting was watered with two quarts of de Vallemont's liquor. Theſe laſt ſhot out later, but then grew with great ſtrength, and retained their leaves a long while. It cannot be doubted but that an infuſion of dung will invigorate plants, and make them grow faſter than they would otherwiſe. The owners of vineyards are here to conſider, whether the expence of people to do this buſineſs may not be greater than the advantages accruing from it will repay: but it is certain that by thus watering their newly planted cuttings, eſpecially with a ſtrong infuſion of dung, they will ſecure their taking root.

"To ſatisfy myſelf in regard to M. Robineau's pretended prolific liquor, I choſe a piece of ground laid out for wheat, and divided it into three equal parts. One of theſe was ſowed in the common way, with ſeeds only limed, and produced one hundred and ninety-two ſheaves to the acre, which yielded ſixty buſhels of corn. Another was likewiſe ſowed in the common way, with ſeed only limed, but two fifths leſs in quantity than is generally uſed, and produced one hundred and ſixty-eight ſheaves, which yielded fifty-four buſhels. The third part was ſowed with the ſame quantity of ſeed as the firſt, but prepared according to M. Robineau's direction. This produced one hundred and fifty-ſix ſheaves, which yielded fifty-four buſhels of grain. From whence it follows, that his method was not of any ſervice to the crop.

"His liquor, when diſtilled over a very ſlow fire, yields a little brandy; what remains in the matraſs, yields a great quantity of ſalt-petre, and the reſidue is a bitter water which contains a ſmall portion of alkaline ſalt. This is nearly what would be obtained from de la Jutais's liquor.

"M. Vandusfel has alſo tried M. Robineau's prolific liquor, and found it attended with no other effect, than that the field where it was uſed had ſomewhat fewer ſmutty ears than other grounds for which the ſeed had not been ſo prepared. But other ſeed which he ſteeped in an infuſion of dung, aſhes, and lime, produced corn totally exempt from ſmut."

An ingenious correſpondent of the editors of the Muſeum Ruſticum, has given us the following improved method of breeding ſeed-wheat.

"I join, ſays this Eſſex farmer, with many others in opinion, that it is beſt every year to change one's ſeed-wheat, and this has been my conſtant practice: I have had many a weary ride to get ſeed that would pleaſe me, for I am, and always have been, very difficult in this matter.

"I have near two hundred acres of land in conſtant tillage: theſe I divide into three portions, ſo that I have every year about ſixty acres in wheat, ſixty more in barley and oats: and the remainder are either fallow, or in beans, peas, or turnips, &c.

"When I firſt came into my farm, I expended annually, of ſeed-wheat, thirty quarters; for, after the example of my neighbours, I allowed four buſhels of ſeed for every acre I ſowed.

"Theſe thirty quarters often coſt me above ſeventy pounds; and God knows I could ſometimes but little ſpare ſo much money, after the great annual expence of getting in my harveſt.

"Some part of my land differs greatly in its nature from the other: near half my farm is a ſtiff deep clay; what bottom it has I know not, as I never could find it in digging my ditches, &c. the other half is a bed of light ſandy loam; with a gravelly hard bottom.

"This difference in the ſoil of my farm is, on many accounts, a great advantage: particularly, my wheat does not all ripen at the ſame time; I have generally nearly got in that growing on my gravelly land, before that on my clay is fit to cut; and I can beſides plow in all weathers, froſt excepted.

"But not to digreſs too much, I took it into my head that, with proper care, I could breed for myſelf, on my own land, as good ſeed-wheat as any I could buy, if not better; and I determined within myſelf to make the experiment.

"Before I made this experiment, I had reduced the quantity of ſeed I uſed on each acre, to three buſhels, which was a great ſaving to me. I had ſtill occaſion for above twenty quarters.

"My firſt ſtep was to ſelect ten acres of the beſt land I had; five from the heavy, and as many from the light part of my farm; this land was by nature rich and good; it lay on the gentle ſouthern declivity of a hill, and required very little manure: it lay in two little detached fields, at ſome diſtance one from the other.

"When I had prepared this land by a winter and ſum-

mer fallowing, in which time the clayey part was plowed ſeven times, and the light land five times, I had both fields ſown with ſome of the beſt wheat I could procure; that for the heavy land I got from Hertfordſhire, the other from a particular friend who holds a farm in Cambridgeſhire.

"When the ſeaſon for ſowing approached, I was mightily pleaſed with the appearance of my two little plots; for they reſembled the beſt-kept gardens, not a weed to be ſeen, and the earth as fine as garden-mould.

"On this occaſion I did not brine my ſeed, but had it put into a large tub; ſome water was then poured on it, and I made a ſtout labourer, with a ſtiff half-worn birchen-broom, ſtir it very briſkly about for near half an hour; this I imagined would waſh off the ſmut, if any there happened to be: the light ſeeds, which were very few, were ſkimmed off.

"I let the wheat afterwards lie three hours ſoaking, when my man again ſtirred it briſkly with the ſame broom, and immediately poured the water off.

"Whilſt yet wet, the ſeed was ſprinkled in the uſual manner with ſlacked lime, in order to prepare it for ſowing.

"My reaſon for not brining it was, that I thought it would bring it too forward; and I rather choſe to ſow it early, which is, I know, in general, a very good practice.

"In ſowing this land, I, in ſome meaſure, followed Mr. Tull's directions; that is, I ſowed my wheat in rows with large intervals in the following manner.

"I had a furrow opened about a rod from the hedge: in this furrow ſome ſeed was by a careful hand very thinly ſcattered, not ſowed in the common way with a fling of the arm.

"It took up time; ſo I had two ſowers to each plow. When the plowman had drawn the firſt furrow, he then opened another, at about ten feet diſtance from the firſt in the land; and ſeed was in the ſame manner thinly ſcattered in this alſo: after this, he returned to the firſt furrow, and drawing another cloſe to it, covered the ſeed; the ſame thing he did by the ſecond furrow: he afterwards went two bouts without any ſeed being ſown in the furrows; but the third bout ſeed, was thinly ſcattered, as before, to form the ſecond row of corn in each bed: another bout was made to cover the ſeed when the two beds were finiſhed, the middle of the interval being left unplowed.

"In this manner both my little fields were ſown, in double rows with intervals about five or ſix feet wide betwixt the beds, and the rows about two feet aſunder.

"The corn came up very well, and preſerved a good wholeſome appearance all the winter.

"Early in the ſpring, that is, in the month of February, I made a careful man ſow the ſpaces betwixt the rows of corn on the heavy land with wood-aſhes, and on the light land with ſoot: theſe were both ſoon waſhed in by the rain, and the effects were ſpeedily to be ſeen in the new-aſſumed vigour of the crops, and this vigour continued till the corn was ripe.

"As ſoon as any weeds appeared, the intervals which were left unplowed at ſeed-time were turned up, and the ſpaces betwixt the rows diligently hand-hoed: this hand-hoeing was ſeveral times repeated, to keep the crop quite clear from weeds, the intervals had alſo ſeveral other ſtirrings; but this work was chiefly done with a very light plow, without an earth-board in the heavy land, and without either earth-board or coulter in the other little field.

"Every thing came very well forward; and when the wheat began to ſpindle, I had the outſides of the rows well earthed-up with a plow, and the inſides with a hand-hoe: the inſides were done firſt.

"At harveſt the fields made a noble appearance: a fine well broke earth ſtriped with rows of healthy wheat.

"The cutting this wheat was very eaſily performed, it ſtood ſo ready to the reapers hands; and when it was houſed and threſhed, it yielded me about four quarters on an acre, one with another, the firſt year, though I have ſince had ſometimes more, ſometimes a little leſs.

"My ten acres then yielded me about forty quarters; and I had occaſion for only about twenty-two to ſow my common wheat-lands: I therefore took only the firſt and prime part of this crop, getting the ſheaves very lightly threſhed; what remained made excellent bread-corn.

"I never ſaw finer ſeed-wheat than mine was this year: my heavy lands I ſowed with the ſeed produced by the light field, and my light lands with that produced by the heavy field.

"As ſoon as I had got in this ſelect crop, I got the intervals in order for ſowing with a ſecond crop, in moſt reſpects continuing the practice of the year before: I had the like ſucceſs, and might, perhaps, with equal advantage, have continued cropping the fields every year in the ſame manner; but, not to depend too much on Mr. Tull, my next crop was a full crop of barley on them, which ſucceeded well: and I ſelected two other plots of ground, of equal goodneſs, for my ſeed-corn huſbandry, as I call it.

"In this manner I have now for ſeveral years paſt managed, growing my own ſeed; and, if any thing, my crops have ſince increaſed; but I have again reduced the quantity from three to two buſhels of ſeed, for each acre of my wheat-land in common: that is, ſuch as I ſow in the ordinary way: on ſome of my rich, ſtrong land, I do not uſe above ſix pecks, and find it anſwer very well.

"I could like to extend this New Huſbandry, or this imitation at leaſt of the New Huſbandry, over all my lands that are in tillage: but in my method of practiſing, the expence would be too great; my ſowers are well paid; I have enough to do to make my plowmen go out of their ordinary way; and it coſts me a great deal hoeing: yet all this I do not grudge to procure good ſeed.

"By introducing the drill-plow and the horſe-hoe I could ſave a great deal of labour on my light lands; and I may probably ſome time or other attempt it: but, at the ſame time, I am very ſenſible, I ſhall find great difficulty in getting men that will even try to do the work with theſe inſtruments. The common labourers in huſbandry hate novelty: they purſue, without murmuring, the old beaten track; but put them out of it, and thought will become neceſſary: the fact is, they imagine it a very great hardſhip to be obliged to work and think too, and all for the ſame money.

"Without great reſolution, and ſome kind of authority, a farmer will be obliged to let them even dig a ditch their own way: innovation they like not in any ſhape, often making uſe of the expreſſion, that they are too old to learn.

"This, to a man who is very much diſpoſed to lend a helping

helping hand towards the improvement of agriculture, is a mortifying circumſtance: there is ſcarcely any thing ſo difficult as to make an obſtinate man uſeful: if, by dint of authority, you oblige him to go out of his way, he will rather contribute to the loſs of your crop, than not to endeavour to convince you that he is in the right. I have often, to my ſorrow, felt the truth of this obſervation.

"Several reaſons, though I deal not much in them, may be aſſigned for the ſeed-wheat I raiſe in the above deſcribed manner, being ſo good.

"In the firſt place, I ſow it on land that has not taſted any dung for ſome years, but is, in its own nature, rich and good: to this practice I aſcribe a great deal of its goodneſs. In the next place, as the corn does not ſtand too thick, it enjoys all the benefit it can receive from the ſun and air: by this means it attains a perfect maturity, and is certainly improved both in bulk and quality.

"This ſlight ſpring-dreſſing I give it, of ſoot or aſhes, is of very great ſervice: it warms the roots, and brings the corn forward; it looſens the earth, and either itſelf gives nouriſhment to the plants, or, at leaſt, puts the earth in a diſpoſition to afford it.

"Not a little is to be attributed to the frequent hoeing betwixt the rows and the ſtirrings of the intervals; and I find one very particular and great advantage reſult from it, which is, that it is an excellent means of clearing my land of weeds; for they no ſooner attain a part of their growth, but they are deſtroyed long before they ſeed.

"Farmers in general think their fields cannot in the ſpring be too full of wheat-plants: the ground ſeems covered with verdure, and the blades are, as it were, crouded for want of room: when the weeds begin to get up, they ſend in a parcel of men and women with weeding-hooks, not letting a hoe come near the land to cut them up: they are ſadly afraid they ſhould not have plants enough at harveſt; whereas, if they were to meaſure and mark off a rod ſquare of land in February, and count the plants growing on it then, and afterwards count them in the beginning of Auguſt, it would almoſt always be found, that four parts in five of them had periſhed in the intermediate months, and that what remained were, by far too much crouded ſtill, and had each but few ſtalks.

"I never weed my corn of late years; for as I allow only two buſhels of ſeed, and often leſs, to an acre, the plants come up thin; and there is of courſe room for a moderate-ſized hoe, which is the inſtrument I clean my land with; and ſo far from being fearful of having my crop injured by this means, I order the workmen, where the plants ſtand too cloſe, to cut them up without mercy, as they would do the moſt pernicious weeds: if there happens by any accident to be a vacant ſpot, they eaſily remove ſome plants to it, with earth above their roots, by the help of their hoe.

"By this management, I in ſome meaſure, reap the benefit of the advantages promiſed in the New Huſbandry; though I have not ſuch opportunities of ſo often giving the plants a freſh ſupply of nouriſhment, nor of earthing them up when the grain is forming in the ear; for, after the corn has put forth its ſtalks to any conſiderable length, it would not be ſo proper to ſend in the hoers: but all the loſs is the want of earthing up the plants ſo late as I could wiſh; for the weeds will, before this time, be pretty well got under, and a few of them will be able to ripen their ſeeds before harveſt, when they will of courſe be deſtroyed by turning in the ſtubble, which I always do as ſoon as poſſible; though many of my neighbours let their ſtubbles lie rough all the winter, for the ſake of feeding a few ſcore of ewes.

"Every farmer has methods peculiar to himſelf; and they are, for the moſt part, ſuch as were practiſed by their fathers, grandfathers, &c. whom they ſucceed, in the culture of their farms.

"My method, as you muſt now be ſenſible, differs from moſt of thoſe uſed by other occupiers of land; and if I cannot ſo well defend them by arguments, an experience of ſeveral years has convinced me that I ought ſtill to perſit in the practice of them: they have anſwered all the ends I could wiſh from them: what could I deſire more?

"I am enabled to raiſe my own ſeed without the trouble of procuring it from a great diſtance, at a large expence, and with a deal of trouble.

"My crops are to the full as good as ever they were, and I uſe leſs ſeed by above one half: my manure goes a great deal farther than it uſed to do, becauſe I beſtow more plowing and other tillage on my land; and I am not ſo much peſtered as I formerly was with weeds, for they now very ſeldom are ſuffered to ſeed on my land.

"Of this laſt evil, I mean that of weeds, I have not, however, yet got quite rid; for ſuch of my fields as border on my neighbour's lands are ſtill often infeſted; ſome of theſe ſame neighbours, I have ſeveral times mentioned, are but ſlovenly farmers, and the weeds which have winged or downy ſeeds, are conſtantly wafted by the wind from their land to mine; ſo that I, in ſome meaſure, am puniſhed for their neglects: thiſtles are this way particularly troubleſome, as the ſeeds of them will ſometimes be carried a very conſiderable way by the wind.

"I have very little more to ſay at this time, except that I never threſh the ſheaves that are to ſupply me with ſeed-corn till juſt when I want to make uſe of it. I have a notion, that the ſeed keeps better in the covering nature has given it, I mean the chaff, than it would do without it; and I am pretty certain it ſprouts ſooner in the ground, the huſk or bran of the grain being preſerved in a tenderer and more yielding ſtate, than it would be were it expoſed to the open air."

The choice of ſeed-corn is undoubtedly very material in huſbandry, and it would ſeem that the largeſt, plump, full-bodied corn was the moſt proper for ſeed, as being the moſt vigorous, matureſt, and fulleſt of flour, and therefore capable of furniſhing the young plant with the moſt plentiful ſhare of nouriſhment: but however plauſable this may appear, experience does not confirm it; but on the contrary, it is abundantly proved by experience, that ſmall thin ſeed, as of wheat, produces as large ears of full-bodied corn, as the full-bodied ſeed, ſelected with the greateſt care.

This is certain, from the common practice of the beſt farmers, who, by choice, buy for ſeed the wheat produced upon burn-baked land, the grains whereof are known to be in general ſmaller and thinner, than thoſe of wheat raiſed upon good land well cultivated.

"Some have thought, ſays Mr. Tull, p. 55, that a large grain of wheat would produce a larger plant than a ſmall grain, but I have full experience to the contrary. The ſmall grain, indeed, ſends up its firſt ſingle blade in proportion to its own bulk; but afterwards becomes as large a plant as the largeſt grain can produce. Farmers,

ſays he, p. 233, in general know this, and chooſe the thinneſt, ſmalleſt grained wheat for ſeed, and therefore prefer that which is blighted and lodged, and that which grows on new broke ground, and is not fit for bread; not only becauſe this thin wheat has more grains in a buſhel, but alſo becauſe ſuch ſeed is leaſt liable to produce a ſmutty crop, and yet brings grains as large as any. I myſelf have had as full proofs of this as can poſſibly be made, in both reſpects. It was from ſuch ſmall ſeed that my drilled Lammas wheat produced the ears of that monſtrous length deſcribed in this chapter [eight inches long]. I never ſaw the like, except in that one year, and the grains were large alſo. And as full proofs have I ſeen of thin ſeed wheat eſcaping the ſmut, when plump large grained ſeed, of the ſame ſort, have been ſmutty."

Here we ſee plainly, that the quality of wheat for ſeed, does not conſiſt in the fullneſs, plumpneſs, and largeneſs of the grain, as by many has been ſuppoſed, but principally in the ſoundneſs of it, of whatever ſize it happens to be, whether large or ſmall.

Secondly, the moſt material circumſtance, next to the ſoundneſs of the grain, ſeems to be in the nouriſhment that the ſeed receives in the ground. This is a remarkable circumſtance, and ſhews the great advantage of good land, and of preparing it well for the ſeed. It ſhews alſo the great benefit of good hoeing, that can, without the aſſiſtance of manure, improve the puny plants ariſing from ſmall ſeed, to ſo great perfection as in this caſe, and produce large well filled grain, and ears of Lammas wheat of ſuch a ſurprizing length as eight inches, which is near twice the length that good ears of ſown Lammas wheat commonly attain to.

It may appear unaccountable in regard to ſeed wheat, that the quality of it is not diſcoverable either from its ſize or appearance, but theſe in other caſes are not to be reſied on. The gardeners direct thoſe who would ſave prime carrot ſeed, to take up theſe roots, in order to ſee that they are fair and ſtraight, and then to replant them, not doubting but the fineſt carrots will produce the beſt ſeed; and in this they ſeem to be right. Yet in ſome caſes that appear ſimilar, this rule is erroneous. "I ſhould not have believed it, ſays Mr. Weſton, had I not been told it by others, and ſince experienced it myſelf, that a very large onion is not the beſt to plant for ſeed." Tracts, p. 10. Hence it appears, that we cannot ſafely reaſon, in ſuch caſes, from analogy; but in tracing the operations of nature, we ſhould depend chiefly upon experiments.

SEED-LIP, SEED-LEAP, *or* SEED-LOP, a ſeed-baſket, or the veſſel in which the ſower carries his ſeed, in order to ſow it.

SEELING, a term uſed by horſe-dealers to imply the time when a horſe begins to have white eye-brows; that is when there grows on that part about the breadth of a farthing, a parcel of white hair, mixed with thoſe of his natural colour. This is a mark of old age, a horſe never ſeeling before he is fourteen, and always before he is ſixteen years old.

SELANDERS. *See* SALENDERS.

SEMBRADOR, an inſtrument uſed in Spain for ſowing corn. *See the article* DRILL-PLOUGH.

SEMIFISTULAR-*Flowers*, are thoſe whoſe upper part reſembles a pipe cut off obliquely.

SEMIFLOSCULOUS-*Flowers*, are thoſe whoſe petals are hollow in the lower part; but in their upper flat, and continued in the ſhape of a tongue.

SETTER, a kind of ſeton or iſſue, made by cutting a hole in the dewlap of an ox or cow, and putting into the wound a ſort of tent formed out of the root of hellebor aſter, by which the ill humours vent themſelves.

To SEW, *or go* SEW, to go dry; ſpoken of a cow.

SHAKING, a diſeaſe incident to ſheep, conſiſting of a weakneſs in their hinder quarters, ſo that they cannot riſe up when they are down. No cure is yet known for it.

SHARD, a fragment of an earthen veſſel.

SHARE, *of a plough*, that part which cuts the ground, the extremity forward being covered with a ſharp-pointed iron, called the point of the ſhare; and the end of the wood behind, the tail of the ſhare. *See the article* PLOUGH.

The length of the whole ſhare from point to tail, according to Tull, ſhould be three feet nine inches; at the top of the iron it has an upright piece called the fin; and near the iron at the other end, there is an oblong ſquared hollow, called the ſocket, the uſe of which is to receive the bottom of the ſheat. Near the tail there is a thin plate of iron, well rivetted to the wood; by means of this plate the tail of the ſhare is held firmly to the hinder ſheat of the plough by a ſmall iron pin, with a ſkrew at the end, and a nut ſkrewed on it, on the inner or right ſide of the ſheat.

The point of the ſhare is that part in which it does not run up to the fin: this point is generally made three inches and a half in length, and ſhould be flat underneath, and round at the top, and the lower part of it muſt be of hard ſteel. The edge of the fin ſhould alſo be well ſteeled, and ſhould make an acute angle with the ſhare.

The ſocket is a ſort of mortiſe; it ſhould be a foot long, and about two inces deep: the fore-end of it muſt not be perpendicular, but oblique, conformable to the end of the ſheat which enters into it. The upper edge of the fore-part muſt be always made to bear againſt the ſheat; but if this end of the ſocket ſhould not be quite ſo oblique as the ſheat, it may be helped by paring off a ſmall part of the wood at the point.

SHAW, a wood that encompaſſes a cloſe.

SHAWLE, a ſhovel uſed in winnowing corn.

SHEARING *of ſheep*, the operation of cutting off the fleece or coat of wool with a pair of ſhears. *See the article* SHEEP.

SHEAT *of a Plough*, that part of the plough which paſſes through the beam, and is faſtened to the ſhare.

The ſheat, or as it is ſometimes called the fore-ſheat, there being another piece of timber behind it ſcaled the hinder-ſheat, ſhould be ſeven inches wide, and faſtened to the beam by a retch (a piece of iron with two legs) and by a wedge driven by it into the hole of the beam. The angle contained between the ſheat and the beam of the plough ſhould be about forty-two degrees.

SHEVES, bundles of corn bound up in the field. *See the article* HARVEST.

SHED, a ſlight temporary covering.

SHEEP, *ovis*, in zoology, a well known ſpecies of cattle, and which are kept at the leaſt expence of any to the farmer. They will thrive upon almoſt any ground, and

and for that reaſon are preferred by many before the larger cattle.

The beſt ſort of ſheep for fine wool are thoſe bred in Herefordſhire and Worceſterſhire, but they are ſmall and black-faced, and bear but a ſmall quantity.

Warwick, Leiceſter, Buckingham, and Northamptonſhire, breed a large boned ſheep, of the beſt ſhape, and deepeſt wool we have got. The marſhes of Lincolnſhire breed a very large kind of ſheep, but their wool is not good, unleſs the breed be mended by bringing in ſheep of other countries among them, which is a ſcheme of late very profitably followed there.

The northern counties in general breed ſheep with long, but hairy wool: and Wales breed a ſmall hardy kind of ſheep which has the beſt-taſted fleſh, but the worſt wool of all.

The farmer ſhould always buy his ſheep from a worſe land than his own, and they ſhould be big-boned, and have a long greaſy wool, curling cloſe and well. Theſe ſheep always breed the fineſt wool, and alſo are the moſt approved of by the butcher for ſale in the market.

For the choice of ſheep to breed, the ram muſt be young, and his ſkin of the ſame colour with his wool, for the lambs will be of the ſame colour with his ſkin. He ſhould have a large long body, a broad fore-head, round, and well riſing, large eyes, and ſtrait and ſhort noſtrils. The polled ſheep, that is, thoſe which have no horns, are found to be the beſt breeders. The ewe ſhould have a broad back, a large bending neck, ſmall, but ſhort; clean and nimble legs, and a thick deep wool covering her all over. To know whether they be ſound or not, the farmer ſhould examine the wool that none of it be wanting, and ſee that the gums be red, the teeth white and even, and the briſket ſkin red, the wool firm, the breath ſweet, and the feet not hot. Two years old is the beſt time for beginning to breed, and their firſt lambs ſhould not be kept too long, to weaken them by ſuckling, but be ſold as ſoon as conveniently may be. They will breed advantageouſly, till they are ſeven years old.

The farmers have a method of knowing the age of a ſheep, as a horſe's is known, by the mouth. When a ſheep is one ſhear, as they expreſs it, it has two broad teeth before; when it is two ſhear, it will have four; when three, ſix; when four, eight; after this their mouths begin to break. The difference of land makes a very great difference in the ſheep.

The fat paſtures breed ſtrait tall ſheep, and the barren hills and downs breed ſquare ſhort ones; woods and mountains breed tall and ſlender ſheep, but the beſt of all are thoſe bred upon new plowed land, and dry grounds. On the contrary, all wet and moiſt lands are bad for ſheep, eſpecially ſuch as are ſubject to be overflowed, and to have ſand and dirt left on them. The ſalt marſhes are, however, an exception to this general rule, for their ſaltneſs makes amends for their moiſture, any thing of ſalt, by reaſon of its drying quality, being of great advantage to ſheep.

As to the time of putting rams to the ews, the farmer muſt conſider at what time of the ſpring his graſs will be fit to maintain them and their lambs, and whether he has turnips to do it till the graſs comes; for very often both the ewes and lambs are deſtroyed by the want of food; or, if this does not happen, if the lambs are only ſtunted in their growth by it, it is an accident that they never recover. The ewe goes twenty weeks with lamb, and according to this it is eaſy to calculate the proper time. The beſt time for them to yean is in April, unleſs the owner has very forward graſs, or turnips, or the ſheep are field ſheep, where you have not incloſures to keep them in, then it may be proper they ſhould yean in January, that the lambs may be ſtrong by May-day, and be able to follow the dam over the fallows, and water furrows; but then the lambs that come ſo early, muſt have a great deal of care taken of them, and ſo indeed ſhould all other lambs at their firſt falling, elſe, while they are weak, the crows and magpies will peck their eyes out.

When ſheep are turned into fields of wheat or rye to feed, it muſt not be too rank firſt, for if it be, it generally throws them into ſcowerings. Ewes that are big ſhould be kept but bare, for it is very dangerous to them to be fat at the time of their bringing forth their young. They may be well fed indeed, like cows, a fortnight before-hand, to put them in heart. *Mortimer's Huſbandry.*

The feeding of ſheep with turnips is one great advantage to the farmers, from the crops they raiſe of them; they ſoon fatten upon them, but there is ſome difficulty in getting them to feed on them; the old ones always refuſe them at firſt, and will ſometimes faſt three or four days, till almoſt famiſhed; but the young lambs fall to at once.

The common way, in ſome places, of turning a flock of ſheep at large into a field of turnips, is very diſadvantageous, for they will thus deſtroy as many in a fortnight, was would have kept them a whole winter. There are three other ways of feeding them on this food, all of which have their ſeveral advantages.

The firſt way is to divide the land by hurdles, and allow the ſheep to come upon ſuch a portion only at a time, as they can eat in one day, and to advance the hurdles farther into the ground daily, till all be eaten. This is infinitely better than the former random method, but they never eat them clean even this way, but leave the bottoms and outſides ſcooped in the ground; the people pull up theſe indeed with iron crooks, and lay them before the ſheep again, but they are commonly ſo fouled with the creature's dung and urine, and with the dirt from their feet, that they do not care for them; they eat but little of them, and what they do, does not nouriſh them like the freſh roots.

The ſecond way is by incloſing the ſheep in hurdles, as in the former, but in this they pull up all the turnips they ſuppoſe the ſheep can eat in one day, and daily remove the hurdles over the ground, whence they have pulled up the turnips: by this means there is no waſte, and leſs expence, for a perſon may in two hours pull up all thoſe turnips; the remaining ſhells of which would have employed three or four labourers a day to get up with their crooks out of ground, trodden hard by the feet of the ſheep; and the worſt is, that as, in the method of pulling up firſt, the turnips are eat up clean; in this way, by the hook, they are waſted, the ſheep do not eat any great part of them, and when the ground comes to be tilled afterwards for a crop of corn, the fragments of the turnips are ſeen in ſuch quantities on the ſurface, that half the crop at leaſt ſeems to have been waſted.

The third manner is to pull up the turnips, and remove them in a cart or waggon to ſome other place, ſpreading them on a freſh place every day; by this means the ſheep will eat them up clean, both roots and leaves. The great advantage of this method is, when there is land not far off which wants dung more than that where the turnips grow, which perhaps is alſo too wet for the ſheep in winter, and then the turnips will, by the too great moiſture and dirt of the ſoil, ſometimes ſpoil the ſheep, and give them the rot. Yet ſuch ground will often bring forth more and larger turnips than dry land; and when they are carried off, and eaten by the ſheep on ploughed land in dry weather, and on green ſward in wet weather, the ſheep will ſucceed much the better; and the moiſt ſoil, where the turnips grow, not being trodden by the ſheep, will be much fitter for a crop of corn, than if they had been fed with the turnips on it. The expence of hurdles, and the trouble of moving them is ſaved in this caſe, and this will counterbalance at leaſt the expence of pulling the turnips, and carrying them to the places where they are to be eaten. They muſt always be carried off for oxen. *Tull's Horſe-hoeing Huſbandry.*

"It can hardly be doubted, ſays M. de Buffon, but that thoſe animals which are at preſent tame and domeſtic, were formerly wild. Yet the weakneſs and ſtupidity of the ſheep being conſidered, and likewiſe that this defenceleſs animal cannot ſave itſelf by flight; that all carnivorous animals are his enemies, ſingling it out in preference to others, and devouring it for the fineneſs of its fleſh: at the ſame time we muſt remember that this ſpecies is not very prolific, and that each individual is but ſhort-lived: when theſe particulars are conſidered we ſhould be inclined to think, that from the beginning of things, the ſheep has been committed to the care of man; that his protection is neceſſary to its ſubſtance, and his care to its multiplying; nor are any deſarts known to afford wild ſheep; but in all places where man does not govern, the lion, the tyger, and the wolf, reign by violence and cruelty; theſe voracious animals live longer, and multiply much faſter than the ſheep: and were we even now to forſake the numerous flocks fed in the paſtures, and on the hills, they would ſoon be deſtroyed before our eyes, and the whole ſpecies extirpated by the number and voracious appetites of carnivorus animals.

"Thus it appears that this ſpecies is indebted to our aſſiſtance and care for its continuance; for it could not ſubſiſt of itſelf. The ſheep is abſolutely without defence or reſource; the weapons of the ram are but weak; his courage nothing more than a petulance, troubleſome to others, uſeleſs to himſelf, and deſtroyed by caſtration. The wethers are ſtill more timorous than the ewes. It is from fear that they ſo often aſſemble in flocks; the leaſt uncommon noiſe cauſes them to leap over each other, or gather cloſe together; while this fear is attended with the groſſeſt ſtupidity: they have not ſenſe to avoid danger; they even appear not to feel their diſagreeable ſituation; they ſtray wherever they happen to be, whether it rain or ſnow; and ſuch is their obſtinacy, that in order to make them change their place, or follow any road, they muſt have a leader, trained to walk before them, whoſe motions they readily follow ſtep by ſtep. This leader himſelf would ſtir no more than the reſt of the flock, were he not driven by the ſhepherd, or hunted by the guardian dog, which is taught to protect and defend them; to guide, ſeparate, gather them together, and direct them in their motions.

"Sheep, therefore, of all quadruped animals are the moſt ſtupid, and have the leaſt inſtinct and contrivance. The goats, which in ſo many reſpects reſemble them, have much more ſagacity; they ſtand in need of no guide, they ſhun dangers; new objects ſoon become familiar to them; whereas the ſtupid ſheep neither ſhuns nor approaches: though under the greateſt want of aſſiſtance, they do not approach man ſo freely as the goat; and what in animals ſeems the loweſt degree either of fear or inſenſibility, they ſee their lambs taken away without anger, without reſiſtance, and without expreſſing their grief by any cry different from their common bleating.

"But this animal, in itſelf ſo deſpicable, ſo deſtitute of ſentiment and internal qualities, is to man the moſt valuable; its utility the moſt immediate and extenſive: it alone ſatisfies wants of the greateſt neceſſity; it furniſhes both food and apparel, beſides the advantages ariſing from the ſuet, milk, ſkin, intrails, bones, and dung of this creature, to which nature ſeems to have given nothing as its property; all is to be delivered up to man.

"Love, the moſt general and active ſentiment, is alone able to impart ſome vivacity to the ram: he becomes wanton, fights, ruſhes againſt the other rams, and ſometimes even attacks his ſhepherd; but the ewe, when in heat, ſeems not at all the more affected, or the more animated; her inſtinct reaches no farther than not to refuſe the ram's approaches; to chuſe her food, and know her lamb. The inſtinct of this animal is the ſurer, as it is more mechanical; and, if I may be allowed the expreſſion, the more innate. A young lamb will, amidſt a numerous flock, find its dam and ſeize the dug, without ever being miſtaken. Sheep are alſo ſaid to be impreſſed by modulated ſounds, to feed more aſſiduouſly, to be in better health, and to fatten ſooner by the ſound of a pipe; and that they are evidently ſenſible of the charms of muſic. But it is alſo ſaid, and I believe with more truth, that muſic rather ſerves to amuſe the ſhepherd's tedious hours, and that to this ſupine and ſolitary life the origin of that art is owing.

"Theſe animals, whoſe inſtinct is ſo ſimple, are alſo of a very weak conſtitution; they cannot bear walking any length of time; travelling exhauſts them; running ſoon puts them out of breath; the ſcorching rays of the ſun hurt them equally with the rain and ſnow. Their diſeaſes are many, and moſt of them contagious. The ſuperabundance of their fat often proves fatal to them, and always hinders their fruitfulneſs; they yean with difficulty; they frequently caſt their lambs, and require more care than any other domeſtic animal.

"When a ewe is near yeaning, ſhe muſt be ſeparated from the flock, and watched, in order to be aſſiſted; the lamb often preſents itſelf a-thwart, or with its feet firſt; and in this caſe, without aſſiſtance, the ewe's life would be in danger. After yeaning, the lamb is raiſed on his feet; at the ſame time all the milk in the ewe's udder is milked out, it being vitiated, and very noxious to the lamb, which is kept from ſucking till the udder is filled with freſh milk: the lamb is kept warm, and for three or four days ſhut up with the ewe, that it may learn to know her, during which time the ewe is fed with good hay, barley-meal, or bran mixed with a little ſalt; and water, whoſe chill is taken off, and mixed with a little quantity of

of flour, bean-meal, or ground millet, given her to drink. At the end of four or five days ſhe may be gradually fed like the reſt, and ſent with the flock, taking care that ſhe be not driven too far, leſt her milk be heated. Some time after, when the ſucking lamb ſhall have gathered ſtrength, and begins to play, no farther care is requiſite; it may be left to follow its dam to the paſtures.

"All the lambs of a weakly appearance are generally diſpoſed of to the butcher; thoſe intended to be kept being the largeſt, moſt vigorous, and having the thickeſt fleece. Lambs of the firſt yeaning are never ſo good as the following. To bring up lambs yeaned in the months of October, November, December, January, and February, they muſt be kept in the houſe during the winter, going out only in the morning and evening to ſuck; but in the beginning of April they may be turned into the open fields. Some time before this a little graſs is daily given them, in order to habituate them by degrees to this new food. They may be weaned at the end of one month; but it is better to delay it for ſix weeks or two months. White lambs, without ſpots, are always preferred to the black or mottled; white wool being more valuable than the black or mixed.

"The proper age for caſtration is at the end of five or ſix months, or even a little later in ſpring or autumn, when the weather is mild. This operation is performed by two different methods; the moſt common is by inciſion, when the teſticles, which are eaſily ſeparated, are drawn out through the wound: the other is performed without inciſion, by tying a ſtring very tight round the ſcrotum above the teſticles: for this compreſſion deſtroys the veſſels which ſupplies them with blood and juices. The lamb, on caſtration, becomes ſickiſh and dull, ſo that it would not be improper to give him, for two or three days, a little bran mixed with a ſmall quantity of ſalt, to prevent a loſs of appetite, which this operation often cauſes.

"At the end of a year, rams, ſheep, and weathers loſe the two fore-teeth of the lower jaw; and they are known to want the inciſive teeth in the upper jaw. At eighteen months the two teeth joining to the former, alſo fall out; and at three years, being all re-placed, they are even and pretty white: but as the creature advances in age they become looſe, blunt, and afterwards black. The age of the ram is alſo known by his horns, which ſhew themſelves in the very firſt year, and, often at the birth, and continue to grow a ring annually to the very period of life. Though ſheep are often without horns, yet they have bony prominencies in the ſame places of the head, where the horns of rams appear. Some ſheep however have two, and others four horns, five or ſix inches in length, but leſs twiſted than thoſe of the ram; when there are four, the two outward are ſhorter than the others.

"The ram is capable of generating at eighteen months, and a ewe may yean at the end of a year; but it is better to delay it till the ewe be two, and the ram three years old. The produce of theſe animals, if too early, and even the firſt, is always weak, and of a bad conſtitution. One ram will be ſufficient for twenty-five or thirty ewes; but he ſhould be remarkable for ſtrength and comelineſs. He muſt alſo have horns; for ſome have none, and ſuch, in thoſe climates, are very indifferent. In a good and comely ram the head muſt be large and thick, the forehead broad, the eyes large and black, the noſe ſhort, the neck thick, the body long and raiſed, the back and rump broad, the teſticles large, and the tail long. The beſt are white, with a large quantity of wool on the belly, tail, head and ears, down to the eyes. The beſt ſheep for propagation are thoſe which have moſt wool, and that cloſe, long, ſilky, and white; eſpecially if at the ſame time they have a large body, a thick neck, and a light method of walking. And it has been already obſerved, that thoſe which were rather lean than fat, bring forth more eaſily than others.

"The ſeaſon of the ewe's heat is from the beginning of November to the end of April; but they may be brought to conceive in any ſeaſon, by giving them provocative foods, as ſalt water, and bread of hemp-ſeed. Each ewe is covered three or four times, and then ſeparated from the ram, which always prefers the older ſheep, and neglects the younger. In the ſeaſon of copulation they ſhould not be expoſed to the rain or bad weather, wet hindering their retention; and a clap of thunder often produces abortion. A day or two after being covered, they are put again to their common diet, without having any more ſalt water; the continual uſe of which, as well as that of hemp-ſeed bread, and other hot aliments, would infallibly cauſe abortion. They go five months, and yean at the beginning of the ſixth; they ſeldom bring two lambs. In hot climates they yean twice a year: but in France, and the colder countries, only once. Some have the ram given to them about the end of July or the beginning of Auguſt, in order to have lambs in the month of January; but the ram is given to a much greater number in the months of September, October, and November; and lambs are in great plenty in February, March, and April. They are alſo to be had in the months of May, June, July, Auguſt, and September, there being no ſcarcity of them but in October, November, and December. The ewe yields, during ſeven or eight months, plenty of milk, which is a good food for children and peaſants. It alſo makes good cheeſe, eſpecially if mixed with that of cows. The time for milking ewes is immediately on their going out to paſture, or on their return; twice a day in ſummer, and once in winter.

"Ewes fatten very faſt during their pregnancy, as they then eat more than at other times. As they often hurt themſelves, and frequently miſcarry, ſo they ſometimes become barren; and it is not very extraordinary for them to bring forth monſtrous productions. However, when properly tended, they are capable of yeaning during their whole life; that is, to the age of ten or twelve years; but generally, when they are turned of ſeven or eight, they break, and become ſickly. A ram lives to twelve or fourteen years; but after eight is no longer fit for propagation: he ſhould then be knit and fattened with the old ſheep. The fleſh of the ram, though knit and fattened, is but of a bad taſte; that of the old ewe flabby and inſipid; whereas that of the wether is the moſt ſucculent, and the beſt of all common meats.

"To form a flock, from which a reaſonable profit may be expected, ſheep and weathers muſt be purchaſed, of about eighteen months, or two years old; and one ſhepard, if careful, and aſſiſted by a good dog, may take care of a hundred. In leading them out to paſture he ſhould go before them, and accuſtom them to know his voice, to follow him without ſtopping, or ſtraying among the

the corn, woods, and fallow lands, where they would do damage. The places that beſt agree with them are downs, and ſmall eminences; low, wet, and marſhy grounds ſhould be avoided.

"During the winter, they are fed at home with bran, turnips, hay, ſtraw, lucern, ſaintfoin, the leaves of elm, aſh, &c. They are, however, led out every day, unleſs the weather be very bad; tho' this is rather to walk than feed them; and in this inclement ſeaſon, it is always near ten in the morning before they are led out; and after ſtaying four or five hours, they are watered, and brought back about three in the afternoon; whereas in ſpring and autumn, they are led to the field as ſoon as the ſun has diſperſed the froſt or humidity on the graſs, and continue there till ſun-ſet. It is alſo ſufficient for them in the ſeaſons, to drink once a day, juſt before they are brought back to the ſheep-houſe, where they muſt always find fodder, though in leſs quantity than in winter. It is only in ſummer that they are to live entirely on the paſtures, whither they are led twice a day, and alſo made to drink twice. They are led out very early in the morning to feed as ſoon as the dew is down, where they continue four or five hours; after which, and being had to the water, they are brought back to the fold, ſheep-houſe, or ſome other ſhady place: about three or four o'clock, when the extreme heat begins to abate, they are a ſecond time led to the paſture, where they continue till the evening; and were it not for the fear of wolves, they ſhould paſs the night in the open air, as they do in England, which would render them more vigorous, clean, and healthy. As too great a heat is remarkably troubleſome, and the violence of the ſun-beams diſorders their heads, and throws them into vertigoes, it is proper to make choice of places ſhaded from the ſun, and in the morning to lead them on eminencies expoſed to the eaſt, and in the afternoon on thoſe that are expoſed to the weſt, that when they are feeding, their heads may be in the ſhadow of their body. Laſtly, in order to ſave their wool, they muſt not be led through any buſhy places.

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The reader is indebted to the ingenious Mr. Irwin for the following obſervations relating to the management of ſheep in Ireland.

"Of all the quadrupeds, ſays he, the ſheep perhaps is the animal beſt adapted by Providence to pay the rent. It requires great attention to it; but, at the ſame time, little bodily trouble. The chief care ſhould conſiſt in their cantonment for food, in which our Iriſh farmers are extremely negligent (I mean thoſe of them that have abilities to be otherwiſe); for they ſtation them promiſcuouſly over the land, encloſing only the fattening grounds, which is done but badly, and other cattle ſuffered to mix with them; whereas ſheep, in their rearing and fattening ſtate, ſhould be by no means ſuffered to perambulate a variety of paſture. For this reaſon.

"Moſt cloſes, or encloſed fields, have ſome herbage, beſides the common graſs, predominant in them; and where ſheep are ſuffered to run over too many of theſe at once, the different mixtures in ſuch extenſive paſtures have, I am convinced, from repeated experimental obſervations, very unfavourable effects on this tender and delicate animal, both as to the rearing and fattening, or as to bone and growth.

"It actually gives, or inclines them to a ſcower, (and other diſorders well known to the ſhepherds) oftentimes not leſs prejudicial than that which they never fail getting in low ſwampy grounds, which always proves mortal to ſheep that are ſuffered to remain ever ſo ſhort a time in ſuch places; for though the noxious inſane effects of ſuch paſture may not immediately appear, or operate on them, it never fails bringing on the rot in the end, which manifeſts itſelf by the ſcower, and other unhealthy ſymptoms.

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"During the winter, they are fed at home with bran, turnips, hay, ſtraw, lucern, ſaintfoin, the leaves of elm, aſh, &c. They are, however, led out every day, unleſs the weather be very bad; tho' this is rather to walk than feed them; and in this inclement ſeaſon, it is always near ten in the morning before they are led out; and after ſtaying four or five hours, they are watered, and brought back about three in the afternoon; whereas in ſpring and autumn, they are led to the field as ſoon as the ſun has diſperſed the froſt or humidity on the graſs, and continue there till ſun-ſet. It is alſo ſufficient for them in the ſeaſons, to drink once a day, juſt before they are brought back to the ſheep-houſe, where they muſt always find fodder, though in leſs quantity than in winter. It is only in ſummer that they are to live entirely on the paſtures, whither they are led twice a day, and alſo made to drink twice. They are led out very early in the morning to feed as ſoon as the dew is down, where they continue four or five hours; after which, and being had to the water, they are brought back to the fold, ſheep-houſe, or ſome other ſhady place: about three or four o'clock, when the extreme heat begins to abate, they are a ſecond time led to the paſture, where they continue till the evening; and were it not for the fear of wolves, they ſhould paſs the night in the open air, as they do in England, which would render them more vigorous, clean, and healthy. As too great a heat is remarkably troubleſome, and the violence of the ſun-beams diſorders their heads, and throws them into vertigoes, it is proper to make choice of places ſhaded from the ſun, and in the morning to lead them on eminencies expoſed to the eaſt, and in the afternoon on thoſe that are expoſed to the weſt, that when they are feeding, their heads may be in the ſhadow of their body. Laſtly, in order to ſave their wool, they muſt not be led through any buſhy places.

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"White wool being much more eſteemed than black, ſpotted or black lambs are almoſt every where ſold to the butcher; though in ſome places the far greater part of the ſheep are black; and for black lambs to be produced by a white ram and ewe, is a phænomenon common in every country. In France there are only white, brown, black, and ſpotted ſheep; Spain has dun ſheep; in Scotland there are yellow; but all theſe differences and varieties in colour are no more fortuitous than the differences and varieties of the breeds, which are, however, wholly owing to the effects of the food, and the difference of the climate." *Buffon's Hiſtoire Naturelle, tom.* v.

The reader is indebted to the ingenious Mr. Irwin for the following obſervations relating to the management of ſheep in Ireland.

"Of all the quadrupeds, ſays he, the ſheep perhaps is the animal beſt adapted by Providence to pay the rent. It requires great attention to it; but, at the ſame time, little bodily trouble. The chief care ſhould conſiſt in their cantonment for food, in which our Iriſh farmers are extremely negligent (I mean thoſe of them that have abilities to be otherwiſe); for they ſtation them promiſcuouſly over the land, encloſing only the fattening grounds, which is done but badly, and other cattle ſuffered to mix with them; whereas ſheep, in their rearing and fattening ſtate, ſhould be by no means ſuffered to perambulate a variety of paſture. For this reaſon.

"Moſt cloſes, or encloſed fields, have ſome herbage, beſides the common graſs, predominant in them; and where ſheep are ſuffered to run over too many of theſe at once, the different mixtures in ſuch extenſive paſtures have, I am convinced, from repeated experimental obſervations, very unfavourable effects on this tender and delicate animal, both as to the rearing and fattening, or as to bone and growth.

"It actually gives, or inclines them to a ſcower, (and other diſorders well known to the ſhepherds) oftentimes not leſs prejudicial than that which they never fail getting in low ſwampy grounds, which always proves mortal to ſheep that are ſuffered to remain ever ſo ſhort a time in ſuch places; for though the noxious inſane effects of ſuch paſture may not immediately appear, or operate on them, it never fails bringing on the rot in the end, which manifeſts itſelf by the ſcower, and other unhealthy ſymptoms.

" A gentleman in my neighbourhood, who occupies ſeveral thouſand acres of deep rich ſoil, ſuffered a conſiderable loſs of ſheep, particularly ewes, in the ſpring of 1759. (I think it was) and that ſeaſon was far from being inclement, eſpecially wet, which is the moſt unfavourable weather to that kind of ſtock.

" I made cloſe enquiry into the cauſes of this uncommon mortality; for ſuch it appeared to me at that time.

" The common reaſons for this deſtructive peſtilence were indeed given: but from ſome obſervations I made from appearances, I did not judge them ſatisfactory.

" It ſeemed to me that a too extenſive run of over fertile, luxuriant ſoil, little or no ſhelter, negligence in folding, and other care not difficult to be taken, but abſolutely neceſſary to the well being of this delicate animal, had brought on a deadly and general rot.

" Many were with difficulty ſaved, only to languiſh away, in all probability, the ſucceeding winter; for though a ſheep, the firſt time it is tanted with the rot, whether in winter or ſummer, may for that ſeaſon, with great care and difficulty, be preſerved, it nevertheleſs ſeldom happens that any amelioration of paſture will make it a long liver; for when it is once touched with this diſorder, a cure may (as in many human chronical diſeaſes) be patched up; but it will never get thoroughly clear of it. Hence the generality of our farmers, though they may think otherwiſe from their practice, appear to me to be in great error in this reſpect.

" But their ſtock is commonly too large, and they are continually buying in, or ſelling out; ſo that by not keeping them for any length of time, they have not proper opportunities to explore rightly the effects of the cauſes we are now inveſtigating.

" The largeneſs of their ſtock, I ſay, prevents them from looking minutely into theſe neceſſary matters, which is not in general the caſe in England. Beſides, from the great numbers they often times poſſeſs, they are ſo accuſtomed to loſſes in this way, and ſo little attendant to phyſical cauſes, that they are things of courſe with them; neglects I call them, that a little attention would eaſily remedy, were the flocks never ſo large: and in this reſpect indeed it muſt be admitted, cuſtom erroneouſly commits too many to the care of one ſhepherd in a country not yet thoroughly improved.

" Through the lazineſs or inattention of the herd (for careleſs they almoſt all are) many caſualties they pretend ariſe from the unimproved ſtate of the farm, and eaſily impoſe them as ſuch on their employers, whereas they ſolely proceed from their own neglect.

" To remove ſheep often is an excellent temporary preventative againſt the rot, and moſt other diſorders incident to them; but to fold them dry a-nights is ſtill more infallible; that is, to keep them from rain; but the largeneſs of the flocks in Ireland, moſt people imagine, is an abſolute bar againſt this ſalutary expedient.

" This is an ill founded ſurmize. If they would divide their ſtock in ſmaller proportion, that is, to limit their ſheep walks to one or two hundred acres at moſt, under the care of one man; to allow to theſe proportions (the land being, we will ſuppoſe, of no more than a middling good ſort) three ſheep *per* acre in ſummer, and one and an half in winter, in the rearing or breeding way; and to erect on every ſuch farm proportionable ſhelter-houſes to a ſouth, or ſouth-by-eaſt aſpect, (but never to the north or weſt, the winds blowing, eſpecially from the latter point too long and cold) there would not be one third of the annual dearth of ſheep there is; and in this computation I fancy the proportion is exceeded.

" Thoſe who hold very extenſive tracts, may ſay this ſimple expedient is not practicable; but it certainly is, both to the conſiderable and inconſiderable farmer, even in parts where timber is not eaſily to be had, which ſeems to be the chief difficulty. Suppoſe now (to give a very feaſible hint) a houſe made of turf (if no ſtone or brick could be conveniently had) one hundred feet long, about fourteen wide, and the wall about five feet high, with four large doors or openings to the aſpects before-mentioned; ſlight and cheap timber girthing, eaſily carried from afar, would do for this buſineſs as well as the beſt; the thatch whether ſtraw out of the barn, or ſtubble, which laſt is far the beſt, we know, is of a trifling value in thoſe parts, and ought to be well ſewed on with ropes, which makes it effectually reſiſt ſtormy weather; and the erecting the wall of turf, or, which is much better, with clay-mortar, well mixed with ſtraw-rubbiſh, we alſo know, cannot coſt much, where labour is but from a groat to ſix-pence a day.

" In ſhort, I could erect one of theſe houſes in this manner on every hundred acres, which is the quantity of land that ought to be allowed to each, for fifteen pounds, Iriſh money, or, at moſt, twenty. The land, ſpoiled by digging off the ſods, would be ſoon reſtored by the treading of the ſheep. The hay-yard, of courſe, to be adjoining this houſe.

" All the objection I think can be made is, the not being able to move theſe houſes, thereby to ameliorate different ſpots of the farm, as they do in Switzerland their wooden houſes that run on wheels.

" Conveniencies in countries are different: in Switzerland there is plenty of wood; in many parts of Ireland the length and difficulty of carriage renders a ſufficiency of it for this purpoſe impoſſible to be had: beſides, moving houſes, for aught I know, may do well in Switzerland, or in England; but ſuch as I mention would anſwer extremely well in Ireland.

" In this way I am ſenſible the winter-mucking would be almoſt always on one ſpot; but it would make much dung, which might be removed to great advantage: and if it had not, it is not evident that it would be much more beneficial to loſe the night-mucking, during the three or four moſt inclement months of the year, than treble the worth of it of one's ſtock? Moreover, I am not clear, but the dung being preſerved from the froſt would go farther than if ſcattered by the ſheep about the land in hard weather: and, though it is much the cuſtom to turn out dung in that ſeaſon, I am certain, (and many phyſical cauſes will demonſtrate it) the ſooner afterwards it is mixed with the land, the more of its virtue it will retain.

" But before I quit the article of ſheep: as I ſaid before, countries and circumſtances differ; for though I do not approve of extenſive unincloſed paſtures in Ireland, it ſeems in Spain they do well enough; the flocks there are ſmall, as in France; but they have a right of commonage in that country, perhaps not in any other civilized one that we know of.

" There it is a conſtant practice with the ſhepherds, ſoon after ſhearing time, to ſet out with their flocks, generally conſiſting of about an hundred each, and to paſs

paſs from one province to another, feeding them promiſcuouſly both on ley and corn lands, the meadows, and ſome other particular encloſed lands, as parks belonging to the nobility, and clergy eſpecially, only excepted.

"These itinerant ſhepherds often travel three or four hundred miles from their habitation with their ſmall flock: they ſometimes take part of their family, a good deal of proviſions, a tent, and ſome well-trained dogs, and are never ſtopped if they keep the ſheep on the open lands, and often do not return home till after lambing-time.

"They generally have one third, or half the profit of the ſtock for their hire." *Muſeum Ruſticum*, *vol.* I. *page* 449.

"I think, ſays another writer in the Muſeum Ruſticum, that early ſhearing ſhould be preferred on many accounts: ſome defer this work till at or after Midſummer; but this ſhould be avoided, as very bad conſequences often enſue. By this late ſhearing, the maggots have an opportunity of breeding in their ſkins; and this frets them in ſuch a manner, that they often pine away, and loſe all their fleſh.

"This is eaſily prevented by early ſhearing, and, therefore if the weather be any thing tolerable, I generally do this work about the middle of May, and ſometimes the beginning of that month: by this method the new growth of the wool has time to get a-head, ſo as to ſecure the ſheep from the attack of the fly. It is true, that at this time of the year the weather is often cold, and chilling rains fall, which might endanger my new-ſhorn ſheep, was no farther care taken of them: but this danger I always guard againſt, by waſhing my ſheep, after ſhearing, with ſalt-water taken from the Medway: this is of great ſervice in killing any vermin that may harbour cloſe to their ſkins; and, beſides this advantage, the penetrating quality of the ſalt ſo warms this animal's maſs of blood, that it is a great means of preſerving it from many diſorders to which it is fatally ſubject; ſuch as the gripes, ſcab, red-water, rot, &c. &c. &c. This, I ſay, has been my practice ever ſince I have lived in Kent; but before that time, when I was not within diſtance of the ſea or Medway, to get ſalt-water from thence, I always made a brine of a proper ſtrength with common ſalt and ſoft water, and applied it to the ſame uſe with equal benefit, though it coſt me, to be ſure, ſomewhat more. When my ſheep have ſores, either by the bite of flies, or by ſcratching, &c. I find the beſt remedy to be that which is commonly in uſe, viz. a little tar applied to the wound: many, if you aſk their advice, will, by way of ſhewing their judgment, preſcribe to you complicated mixtures, which have no other merit but being more expenſive: but be aſſured, the more ſimple the remedy, the ſpeedier the cure.

"Many farmers ſuffer great loſſes by buying ſheep that are rotten; for which reaſon, every prudent man ſhould, when he buys a lot of ſheep, agree with the ſeller, that he ſhould warrant them ſound for a month at leaſt: this would prevent many heavy loſſes, and be a means of guarding honeſt men from being impoſed on. If ſheep are the leaſt inclinable to the rot, the beſt remedy is to drive them directly into a dry upland paſture.

"Though I ſhear my ſheep ſooner than moſt of my neighbours, I ſhould alſo have obſerved, that I always ſhear my fat weathers firſt, as they are beſt able to bear the cold; and I reſerve my poor ſheep till laſt, as the cold and chilling rains pinch them more than the others." *Muſeum Ruſticum*, *vol.* I. *page* 210.

I never uſed, ſays Mr. Liſle, "to ſhear till the Monday before Midſummar day; but I now (anno 1714) find I was in an error in ſo doing; and that, as my keeping is very good, by which means the wool grows the larger, and heats the ſheep the more, and their fleſhineſs being ſuch as to bear the cold the earlier in parting with their fleeces, I ought to begin to ſhear the firſt week in June; and the ſheep would not only thrive much the better, when the load of their wool was gone, but their new wool would alſo have more time to grow againſt Wayhill fair, which would make the ſheep look more burley." *Liſle's Huſbandry*, *vol.* II. *p.* 275.

We cannot but in general approve of the early ſhearing of ſheep, beginning with the fatteſt; but no certain day can, with reaſon, be fixed for doing this work; for our ſeaſons differ ſo much in various years, that next year, in the beginning of May, the weather may be ſo warm as to be very proper for the work; and in the following year, the middle of the ſame month may, on account of the cold, be too ſoon to begin. The beſt regulator for this work, as well as many others, would be the ſtate of vegetation, from repeated obſervation of ſome particular tree or plant, on a particular ſoil and expoſure; for to bring plants to a certain ſtate, requires always a certain degree of heat, and this is ſooner or later, according to the ſeaſon. Every work of huſbandry, in ſpring at leaſt, might be regulated in the ſame manner, and that to great advantage, for nature is an unerring guide.

The ſheep of the Ardennes, a foreſt in Lower Germany, are every where celebrated for the exquiſite delicacy of their fleſh; and from a particular method of ſhearing them, their wool alſo is in no leſs eſteem.

"Amidſt all the accidents and diſtempers to which ſheep are liable, ſeldom any of them are known to die, certain innocent remedies ſoon reſtoring them. I have obſerved, every where elſe there is a fixed ſeaſon for ſhearing ſheep; and accordingly I have ſeen not a few, after being ſhorn, ſhivering with the ſharpneſs of the air; whereas, in the Ardennes, if the month of April or May be too hot or too cold, the ſhearing is delayed; and it is not often they ſet about it before the middle of ſummer. If, when bared, they are found to have received any wound in the ſhearing, it is rubbed over with a liquid pitch, and all the reſt of the body well waſhed with wine or oil.

"In ſome part of the Ardennes, the wine is mixed with oil-lees, or an ointment is made of wine, oil, and virgin-wax; and this precaution is ſaid not only to thicken their wool, but alſo preſerves them from ſores and the ſcab. They are never ſheared in the morning, it being a proverb in the country, that wool is to be ſheared, as fruits deſigned for keeping are to be gathered, when the dew and coolneſs have been exhaled by the heat of the ſun. If ſheep are ſheared when ſweating, the wool, by imbibing the ſweat, becomes the ſofter and better coloured.

"Sheep are ſubject to a kind of diſtemper, which, within two or three weeks, frequently ſweeps away a whole flock; but, to prevent ſuch a fatality, the Ardennes ſheep, at the beginning of the ſpring, have a certain potion given them.

"The flock is firſt carefully examined, and the ailing

ſheep ſeparated from the ſound; an excellent method! yet is the Ardennes the only place where I ever ſaw it practiſed: after this, the juice of wild ſage and horehound, well cleanſed, is mixed in their drink, and this continued for a fortnight ſucceſſively. In autumn this medicament is repeated; and thoſe which are ſick likewiſe go through the ſame courſe during a fortnight, and generally with a very happy effect.

"Upon being ſeized with the ſcab, which the negligence of the ſhepherds does but too often occaſion, an ointment is prepared for them of the juice of any kind of ſage, mixed up to a conſiſtency with pulveriſed ceruſs and freſh butter: with this the ſheep are rubbed, and, three days after, waſhed with the urine of a ſhe-aſs, which cures them.

"If the exceſſive heats have ſo affected them, that they grow ſickly and faint, and even to a total loſs of appetite, the juice of wild beets is mixed in their drink, and endeavours are uſed that they ſhould eat them, which if they can be brought to, they are the ſooner upon their legs; but if any aſthmatic ſymptoms appear in the ſheep, the tip of their ears is cut off, after which the paunch of a ſheep being thoroughly boiled in wine, a ſpoonful of the liquor is given to every ſheep; and this never fails, in a very little time, to ſet them to rights.

"The cough is ſo common a diſorder among ſheep, that one ſeldom paſſes near a flock without hearing it in ſeveral: yet in the Ardennes it is otherwiſe; for upon their firſt coughing, a radical cure is wrought by ſyringing, during ſix or eight days, up the ſheep's noſtrils, blanched almonds pounded in wine.

"It ſometimes happens that ſheep feed in paſtures intermixed with noxious herbs, which not ſeldom occaſion their belly to ſwell; and this, without a ſpeedy remedy, proves fatal; but, upon the firſt appearance of it, they are bled in the lip, and a ſpoonful of man's urine adminiſtered to them, which makes a perfect cure.

"If along with the graſs they have eat any worms or leaches, olive-oil, mixed with warm vinegar, is poured down their throats: this not only cures them of the preſent evil, but preſerves them from ſeveral other accidents.

"An abſceſs, or impoſthume, in the ſheep is cut, and ſalt, well pulverized and burnt with liquid pitch, ſtrewed over the inciſions.

"In order to make the ſheep good nurſes, ſo that they may be able plentifully to ſuckle two lambs, all they do is to bind dittany (in ſome places called pepper-wort) and trefoil to their bellies.

"Upon the lambs being ſick, a few ivy-leaves are given them to eat, which after a week ſo well reſtore them, that they ſuck very vigorouſly." *Muſeum Ruſticum, vol.* IV. *page* 420

"There are, ſays Mr. Mills, in this kingdom, vaſt tracts of ground, known by the name of downs, on which are chiefly fed large flocks of ſheep. Experience has abundantly evinced, that though the graſs there is naturally ſhort, it is an excellent food for ſheep; and as the welfare of theſe creatures is of the utmoſt conſequence to one of the moſt eſſential branches of the commerce of England, very great caution ſhould be uſed in making any alteration in their diet, till it be well proved, by fair experiments, that a richer paſture does not injure their fleeces. I would therefore recommend, in the ſtrongeſt manner, to gentlemen who have eſtates bordering on ſuch downs, particularly on that extenſive tract called Saliſbury Plain, which reaches from the weſtward of Marlborough to the ſea, to bring ſome of their ſheep into rich paſtures, of different graſſes, as well natural as artifical, and to keep them there for ſome generations, in order to aſcertain with certainty, what the effect will be.—The word generations, may, perhaps, here terrify at firſt, as implying a long ſpace of time for theſe experiments, thoſe who do not immediately conſider in how few years this ſucceſſion may take place.—A lamb reared from its birth on, for inſtance, burnet, will, in two years, bring a lamb, which, in two years more, brings young, and the ſixth year may ſee the third generation: ſo that by the end of ſeven or eight years the fact may be aſcertained.

"If ſheep will be equally benefited by richer paſture, then the farther improvement of theſe downs muſt become a matter of great concern, both to individuals and to the public; becauſe, granting that they may be improved with ſafety, the number of our ſheep may be greatly increaſed: but if ſuch improvement ſhould be found in the leaſt detrimental to ther wool, inſtead of being encouraged, it ſhould be forbidden, even by law." *Mill's Huſbandry, vol.* III. *page* 379.

SHEEP's-DUNG. *See the article* DUNG.

SHEEP's-*feſcue-graſs*. *See the article* GRASS.

SHEEP-LEASE, *Sheep-ſtate*, or *Sheep-walk*, paſture-land, appropriated to the feeding of ſheep.

SHEER, pure, clean, unmixed.

SHELLS, a hard, and as it were ſtony covering, with which certain animals are defended, and thence called ſhell-fiſh.

The vaſt beds of foſſile ſhells found at great depths in the earth, as well as thoſe found lying on the ſea-ſhore, make an excellent manure for cold clayey lands. *See the article* CLAY.

SHEPHERD's-*Needle*, the name of a plant, ſo called from the remarkable ſhape of the ſeeds, with their appendage, reſembling the crane's bill.

SHIPPEN, a cow-houſe.

SHOEING *of horſes*, the operation of faſtening a piece of iron on the bottom part of a horſe's hoof.

The affair of ſhoeing horſes, is ſo important in its conſequences, both for the preſervation of the foot, the ſafety of the legs, and the eaſe of their motion, that we cannot be too attentive to any innovations, that may be recommended to us in this reſpect; we ſhall therefore give Mr. La Foſſe's ſentiments on this ſubject, with ſuch animadverſions as have occurred to us.

In order to underſtand this new method of ſhoeing, it is neceſſary firſt to premiſe the following obſervations, and attend to the anatomical plates before referred to.

It is moſt certain, that all horſes, except ſuch as have their feet overgrown, or ſuch as may have a particular occaſion of being ſhod, to preſerve the ſole, may, at any rate, go without ſhoes; and there are many examples, without mentioning the cuſtoms of Arabia, or Tartary, of horſes who are at daily work, without the leaſt need of ever being ſhod: but as we employ all our care, and addreſs, to hollow the foot, by paring it even to the quick, and to form an exact fine frog, it becomes abſolutely neceſſary to ſet ſhoes on them.

The original deſign of ſhoeing horſes, was undoubtedly intended as a preſervative of the hoof, and a defence of the ſole; but no one ſure could think it neceſſary

ſary to pare away, what he wanted to preſerve by the uſe of the ſhoes; becauſe that would be to act contrary to his firſt principles, and deſtroy his own work.

This precaution could never be recommended, but in caſes where the horny ſole is uneven, inſomuch, that the ſhoe could not bear equally upon it, which would take off from its neceſſary firmneſs; in ſuch a caſe, it may be reaſonable, otherwiſe it would be very abſurd.

Let us now obſerve the going, as well as the external and internal ſtructure of a horſe's foot.

The horſe then who draws, preſſes firſt on the toe, then ſucceſſively on the ſides, to eaſe the toe; then the horſe's heel yields upon the heel of the ſhoe, from which it immediately riſes again.

The ſaddle, or pack horſe, places the toe but lightly, ſo that the point of ſupport, is fixed neither upon the heel, or toe, but between both; which it is eaſy to demonſtrate anatomically.

Thus the cannon-bone preſſes on the paſtern, this on the coronary, the coronary upon the coffin, or foot-bone, and upon the nut-bone.

By this deſcription of the bones, we may obſerve two eſſential things, which lay open the faults in the preſent method of ſhoeing, and points out the means of being able to remedy them for the future; one is, that the effort of the weight of a horſe, does not bear, either upon the toe or heel, but on the middle, between both; the other ſhews, the greater the diſtance of the ſole from the ground, or from whatſoever point of ſupport, the more the puſhing the coronary-bone upon the nut bone will fatigue the nerve, or tendon upon which it reſts, by the inordinate diſtenſion it undergoes at every ſtep the horſe takes.

Thus we ſee, that by hollowing away the ſole in paring, the horſe is ſuſtained only upon the walls of the hoof, which having no aſſiſtance of ſupport from the horny ſole, is immediately worn, and battered by the weight of the horſe's body; and the ſooner he treads upon any hard ſubſtance, the ſooner he grows quite lame.

For by the connection, thickneſs, and flexibility, as well as contexture of the horny ſole, it ſeems to be wholly deſtined by nature, to ſerve, as a cuſhion to the fleſhy ſole, and tendon, which reſts upon it, in order to break the violent ſhocks of a pavement, ſtone, or any kind of ſtump, or external violence; but by paring it away in the cuſtomary manner, the horſe loſes his defence of nature, againſt ſtumps, nails, glaſs, &c. and thus the fleſhy ſole becomes eaſily bruiſed, or wounded.

It is obſervable, that a horſe ſeldom goes eaſy, or eſcapes being ſoon jaded, if the frog does not bear upon the ground, and it is the only point of ſupport to the tendon; ſo that if you keep it at any diſtance from the ground, by paring it away, an inordinate diſtenſion will happen to the tendon: which being repeated at every ſtep he goes, fatigues it, and cauſes an inflammation; whence alſo relaxations, defluxions, and tendinous ſwellings, eſpecially after long journeys, or hard riding, which are occaſioned more by the paring of the ſole, than the length of the journey; experience has ſhewn, that the frog neither ſuffers, or has ſhewn the leaſt ſign of fatigue, or ſenſibility, by being thus expoſed; and indeed from the ſtructure of it, it is ſcarce poſſible; for being of a ſoft ſpongy flexible ſubſtance, by its natural elaſticity, it yields to the weight of the body, the inſtant the horſe preſſes his feet to the ground, and immediately recovers it again; however, there is one caſe, whereby the frog may occaſion lameneſs, which is when it grows hard or dry; but by taking off the little end of the frog, this diſorder is ſoon remedied.

As the bad conſequences of pairing away the ſole and frog, have been pointed out, and, I think, evidently proved, let us obſerve now, the ill effects of modern ſhoeing; for it is upon the form of the ſhoes, and the manner of ſetting them on, that not only the preſervation of the foot, but alſo the ſafety of their legs, and the eaſe of their motion depends.

In effect, the more eaſy our ſhoes ſet upon us, the more active we are; ſo a large, long, thick ſhoe ought to have the ſame effect upon horſes, that wooden ſhoes have upon us; that is, make them heavy, unwieldy, and hobbling.

A long ſhoe is not only perfectly uſeleſs, but it is even prejudicial; for the horſe's heels coming to ſink upon thoſe of the ſhoes, the longer the lever, the greater will be the drag upon the clinches of the nails of the toe; and thus horſes will be more apt to ſtrike them off on many occaſions; eſpecially when they are apt to overreach.

The longer the ſhoe is, and the more it covers the ſole, the more liable the horſe will be to fall, trip, and hobble in his walk; particularly if he goes on a pavement; becauſe the ſurface being formed of round parts, and the ſhoe having a large uniform hard face, he can ſcarce have above two or three points of ſupport.

It is thought by ſome, that ſtrong ſhoe-heels are an eaſe to the weak heels, and fetlocks of horſes; as if the body of the ſhoe was flexible enough to yield to the horſe's heel; and under this notion, they raiſe the ſhoe-heel, and leave a vacant ſpace between that and the horſe's heel; but the direct contrary happens, for it is the hoof, that by its flexibility yields to the ſhoe-heel, which is quite inflexible: the thicker the ſhoe-heel is, the more ſubject that of the horſe is to meet it, and inſtead of being eaſed, the horſe's heel becomes more compreſſed, as if in a conſtant vice, becauſe it has always the ſame point of ſupport.

By this means, they deprive them of the liberty of going with eaſe upon a pavement; becauſe the ſhoe does not bear upon a level, and produces an effect, like that of a pivot, upon the middle of the ſhoe-heels, and the vault, or hollow.

To obviate theſe inconveniencies, M. La Foſſe propoſes the following method of ſhoeing; that neither the ſole, or frog ſhould be pared at all; for neither will ever become too large by its growth; but in proportion as it grows, it will dry, ſcale, and fall off in flakes; that the edge of the hoof, if thought too long, ſhould be taken down as uſual; and then a ſhoe, in form of a half moon, ſet on, reaching the middle of the hoof; the heels may be thinned, and the ſhoes made a little longer for ſuch horſes as have weak hoofs.

Eight ſmall nails, made in the old way, that is, having very ſmall heads, are incruſted in the holes, which are made, as the head is, in an oblong form; the figures both of the ſhoe and nail, are to be ſeen in the plate. This is the whole myſtery.

By this method, the ſole is preſerved, and conſequently the foot defended againſt hard, or ſharp bodies, which the horſe may chance to tread on; thus inflammations,

and dangerous compreſſions are avoided, and the many inconveniencies already mentioned, from the lodgment of ſand, gravel, or ſtones.

Another advantage ariſing from this method of ſhoeing, and preſerving the ſole, that natural defence againſt external injuries, is, that in not paring away the ſole, nor ſetting on any more ſhoe than is neceſſary to preſerve the horny ſole; the horſe will not be ſubject to ſlip, either on the winter's icey pavement, or the dry ſmooth one of the ſummer.

For by making a horſe walk upon the frog, and partly upon the heel, the former being ſtrongly rubbed, and puſhed againſt the ground, or pavement, impreſſes itſelf, as it were, by the weight of the horſe's body, into the inequalities, and interſtices it happens to meet in its way; by this means, the foot is ſtung on a great many more parts, which mutually eaſe it, by multiplying the points of ſupport, gives the animal a ſtronger adherence, and more ſecurity upon the place he goes.

By paring away the ſole, the air when it is in this thin ſtate, penetrates, and dries it to ſuch a degree, that by its contraction, it compreſſes the fleſhy ſole, ſo as to lame the horſe.

By this means, alſo ſand, and gravel get in, and are ground between the ſole, and ſhoe; and again between the horſe's heel, and thoſe of the ſhoe; which not readily coming out again, cauſe compreſſions, inflammations, &c. which laſt accidents are very often the effects of a ſtone's being wedged in between the ſhoe-heels.

To recapitulate the whole.

The weight of the ſaddle horſe does not preſs upon the toe, or heel, but on the middle between both; ſo that the greater the diſtance of the ſole from the ground, or from whatever point of ſupport, the more the great tendon will be fatigued, by the inordinate diſtenſion it undergoes at every ſtep.

The more the ſole is covered by the ſhoe, the more the horſe will ſlip, ſlide, or fall; becauſe the ſurface being formed of round parts, and the ſhoe having a large uniform hard face, he can ſcarce have above two or three points of ſupport; ſo that the greater contact the horſe's foot has with the ground, the more points are multiplied, and the ſafer of conſequence he goes.

By ſhoeing, no other intention could be expected, but preſerving the hoof, after paring away its luxuriancy.

That long ſhoes, and raiſing the ſhoe heel, is a very pernicious cuſtom.

By paring away the horny ſole, it hardens in proportion to its being thinned, and by compreſſing the fleſhy ſole, makes a horſe lame; he loſes alſo the defence of nature againſt external bodies, by which means, the fleſhy ſole becomes often wounded, bruiſed, &c.

By paring the frog ſo much away, that it is not in contact with the ground, the tendon will be inordinately diſtended: by which means, it becomes ſubject to inflammation, relaxation, defluxion and rupture.

Laſtly, It appears from the anatomy of the foot, that horſes are chiefly lame in thoſe bones and its tendon; that the preſent method of ſhoeing contributes greatly thereto, by paring away the horny ſole, and hollowing the foot; by which means, the fleſhy ſole becomes more expoſed to accidents, and the tendon fatigued, ſtrained, and ruptured; its ſupport being taken away by paring the frog.

We may learn alſo from hence, that no more of the toe ſhould be pared away, than to keep the foot uniform with the ſhoe; that the ſhoe ſhould be made flat, in order to adapt itſelf the better to the foot; not made too thick, or hollow, nor projecting beyond the horſe's heel.

This is the ſubſtance of M. La Foſſe's new method of ſhoeing; which from its ſimplicity, and the great eaſe of performing it, ſeems to demand our regard and attention; but though it appears well calculated for the flat pavements, and roads of France, yet we doubt its general ſucceſs with us; eſpecially in ſome of our rough ſtony countries, where the heel, and frog, being left ſo entirely defenceleſs, might be liable to frequent injuries from ſuch irregular looſe bodies, as flints, looſe ſtones, &c. We ſhould ſuſpect alſo its ſucceſs, on moiſt, greaſy, and ſlippery ſoils, or chalks; where the ſhoe heel, or cramps, ſeems of great uſe, to ſupport a horſe, by the impreſſion it makes in the ſurface; how inconvenient ſoever it may be in other reſpects: tho' it muſt be confeſſed, from our method of ſhoeing race horſes, where the whole foot comes into immediate contact with the ground, notwithſtanding the courſe they run over is often very ſlippery, yet they ſeldom fall.

But though this method may not be ſo generally adopted by us, in its utmoſt extent, for the reaſons above given; as well as from the different texture of horſes feet, which in ſome will always demand a particular method of ſhoeing; yet it undoubtedly may ſuit many horſes, and many different parts of the kingdom; and this particular advantage every one may reap from it, viz. to pare away as little of the ſole and frog as poſſible, even in the old method of ſhoeing: the many inconveniences of which, we apprehend, have been ſufficienty pointed out, and amply explained; and would, by this means, be in a great meaſure obviated.

EXPLANATION of Fig. 1, 2, 3, 4, Plate XXIV.

Fig. 1. repreſents the bottom of a horſe's foot.

a, *a*, *a*, is the horny ſole.

b. the frog.

2. The hoof towards its lower edge, called by the author the wall of the foot.

Fig. 2. ſhews the horny ſole *a*, raiſed from the fleſhy ſole *c*. *c*. *c*. round which is the enchanelled fleſh, 6. placed in the ſulcus of the inner ſurface of the hoof: 5. the horny part of which is ſoft and white.

Fig. 3. repreſents the under part of the fleſhy ſole *c*. raiſed from the foot-bone, or what Gibſon calls the coffin-bone *d*. *d*. *d*. *g*. the covering or ſheath of the Tendo Achillis. 2. The cartilage. 6. The edge of the fleſhy ſole confined in the furrow of the channelled horny ſubſtance. *Bartlet's Farriery, page* 352.

SHOODS, oat hulls.

SHOVEL, a well known inſtrument, conſiſting of a long handle, and a broad blade, with raiſed edges.

SHOWEL, a blind for a cow's eyes.

SHROUD, a ſhelter, or harbour.

SHUCK, a huſk or ſhell.

SICKLE, a toothed hook, with which corn is reaped.

SIEVE, hair, lawn, or baſket-work, ſtrained on a hoop,

hoop, for ſeparating the flour from the bran, the duſt from corn, &c.

SIG, urine, chamber-lie.

SIKE, a little rill, a water furrow, a gutter.

SILVER-WEED, or *wild Tanſey*, a ſpecies of cinque-foil, which grows naturally upon cold ſtiff land in moſt parts of England, and is a ſure mark of the ſterility of the ſoil. Its ſtalks ſpread upon the ground, and ſend out roots from their joints; by which means, and by the frequent ſheddings of its ſeeds, for it flowers during the whole ſummer, it ſoon over-runs, and fills the land to a great diſtance. The leaves of this plant are compoſed of ſeveral lobes or wings, which are generally placed along the mid-rib, and terminated by an odd one: they are jagged at their edges, and are of a ſilvery colour, eſpecially on their under ſide. The way to deſtroy this kind of growth has been already pointed out. Mr. Rays ſays, that the root of wild tanſey, which is ſomewhat of the parſnip kind, is good to eat, and that hogs are very fond of it.

SIMPSON, groundſel.

SIT-FAST, a part of a horſe's hide turned horny, and which if it cannot be diſſolved, and ſoftened by rubbing with mercurial ointment, muſt be cut out, and afterwards healed as a freſh wound. It generally proceeds from a warble. *See the article* WARBLE.

SIZZING, yeaſt, or barm.

SKID, the chain by which the wheel of a waggon is faſtened, ſo as to prevent its turning round, upon deſcending a ſteep hill.

SKILLING, an iſle, or bay of a barn.

SLAB, the out-ſide plank of a piece of timber when ſawn into boards.

SLECK, ſmall pit coal.

SMUT, a diſtemper incident to corn, and which, according to M. Duhamel, may be diſtinguiſhed by the following marks.

"1. This diſtemper deſtroys entirely the germ and ſubſtance of the grain.

"2. It affects not only the ear, but alſo, in ſome degree, the whole plant, when it has made a great progreſs.

"3. It very ſeldom happens but that when one ſtalk is ſmutty, all the ears of the other ſtalks from the ſame root are ſo too.

"4. So early as in March or April, upon opening carefully the hood or blades which cover the ear, and examining the young ear, then not above the ſixth part of an inch in length, and almoſt cloſe to the roots, I found this embryo already black, and attacked with this diſtemper. Perhaps it may not always ſeize the plants ſo early.

"5. When the diſtempered ear comes out of its coverings formed by the blades, it looks lank and meagre; the common and immediate coverings of the grains are in this caſe ſo very ſlight and thin, that the black powder is ſeen through them; and from this time nothing is found, in lieu of grain, but a black powder, which has a fetid ſmell, and no conſiſtency. As this powder, of which the conſtituent particles have but very little cohe-ſion, and of which the coverings are deſtroyed, is eaſily blown off by wind, or waſhed away by rain, the huſband-man, in houſing theſe plants, houſes only ſkeletons of the ears. If any impreſſion of this powder remains, it is eaſily taken off by ſifting: but I have not experienced it to be contagious, like that of burnt-grain.

"M. Tillet, who gained the prize propoſed by the Academy at Bourdeaux for the beſt account of what renders black the mealy ſubſtance of grain, has obſerved that theſe corrupted ears are often found to be vitiated even in the hood, though this laſt looks as green and perfect as if nothing ailed the corn within. The upper part of the ſtalk of a ſmutty plant is not, commonly, quite ſtrait, from within about half an inch below the ear. If ſuch a ſtalk is ſqueezed there, it ſcarcely yields at all to the preſſure. If it be cut aſunder at about a ſixth part, or a quarter of an inch, below the ear, it will be found to be almoſt entirely filled with pith, in ſuch manner that only a very ſmall opening can be perceived in the heart of this ſtalk, inſtead of the large pipe that is in healthy ſtems. M. Tillet concludes from hence, that the circulation of the juices is obſtructed in the upper part of the ſtalk of ſmutty plants.

"Bearded wheat is apt to be ſmutty, as well as that which is not bearded; but neither M. Tillet nor I have ever met with a ſmutty ear of rye.

"Cauſes of ſmut.—The ſmuttineſs of corn cannot be owing to a want of fecundation, as many have hitherto miſtakenly imagined; ſince it affects and deſtroys the organs of both ſexes long before the time of that fecundation.

"It cannot be imputed to the ſettling of wet upon the ears, or to fogs, or to a violent impreſſion of the ſun; ſince we have ſeen the ears ſmutty long before they ceaſed to be covered with the blades, which continue green till the diſtemper has made great progreſs.

"The ſame obſervations refute abſolutely the opinion of thoſe who ſuppoſe the cauſe of the ſmut to be in the grains after they are formed, and before they are paſt their milky ſtate.

"The ſmut of corn has been alſo aſcribed to the moiſture of the earth: but we do not ſee more ſmutty plants in the loweſt, and conſequently wetteſt parts of a field, than in the higheſt and moſt dry. Beſides, why ſhould there be a ſingle ſmutty plant in the midſt of numbers of ſound ones? However, as it appears that corn is more frequently attacked with this diſtemper in wet years, than when the ſeaſons are dry; too much moiſture may perhaps, without being the immediate cauſe of the ſmut, favour its progreſs more than drought would do.

"Some naturaliſts have aſcribed this diſtemper to inſects. If I am not authoriſed abſolutely to deny this, I can at leaſt aſſert that, after having been of this opinion for ſome time, all my endeavours to eſtabliſh it by facts have proved ineffectual. Some obſervers have indeed ſhewn me different inſects in ſmutty grains; but as I found the very ſame kinds likewiſe in ſound ears, I believe, with M. Tillet, that they are not in any manner the cauſe of this diſtemper. We know that the corn-caterpillar devours the mealy ſubſtance of the grain: but it does not occaſion ſmut. Numbers of flies lay their eggs upon theſe ſeeds; and the worms and maggots which proceed from them, eat the ſeeds: but this does not occaſion any thing like ſmut. The Reverend Dr. Hales, to ſatisfy himſelf whether the ſmut of corn might not proceed from the ſeeds being bruiſed by the flail, took a number of grains of different ſizes, and bruiſed them with a hammer. They grew well, and bore ears which were not ſmutty. Thus his own experience convinced this ſkilful philoſopher, that he had conceived a wrong idea of the cauſe of this diſtemper.

"Several

"Several cultivators have thought that pigeons dung and that of ſheep render corn ſmutty: but this is a groundleſs notion. We have large pigeon-houſes, the dung of which it ſtrewed upon our wheat lands: the ſame is done with the dung of our ſheep, and we even fold our flocks upon thoſe lands: yet we do not find that theſe fields are more infected with ſmut than others. This allegation is therefore abſolutely deſtitute of proof.

"Wolfius was of opinion that the ſmut of corn proceeds from a monſtroſity of the embryo: but M. Aimen has refuted that ſuppoſition, by ſhewing that the male flowers of certain kinds of plants are attacked with this diſtemper: now the flowers have not any embryo.

"M. Aimen, M. D. has very judiciouſly obſerved, that the ſmut of corn cannot derive its origin from a defect in the ſap; as all the parts of the plant, except the ear, look healthy, and there are plants whoſe roots are perennial, which appear vigorous, though their ſeeds are ſmutty every year. He is of opinion, that whatever weakens the plant is apt to bring on the ſmut, and inſtances, as a proof of this, that it is a frequent cuſtom in his country to cut rye as ſoon as it ſpindles, for food for their cattle; and that this rye generally produces other ears, which ſeldom contain any but diſtempered grain: to which he adds, that ſeed-corn which had been pricked or run through with a needle; or which is not thoroughly ripe, and that which produces lateral or ſecond ears, is ſubject to the ſmut.

"The ſame obſerver, who has made ſeveral careful reſearches into what is properly called the ſmut of corn, holds that this diſtemper proceeds from an ulcer which attacks firſt the parts that ſuſtain the ſeeds, and afterwards ſpreads to the reſt of the flower. But, ſome will ſay, what is the primary cauſe of that ulcer? In order to diſcover it, M. Aimen examined ſeveral grains of barley with a microſcope: ſome of them were bigger than others: ſome were very hard; and others yielded to the preſſure of his nail: ſome were of a deeper, and others of a lighter colour; ſome longer, and others rounder, than they ought to have been: their rind was ſomewhat wrinkled in ſeveral places, whereas in its natural ſtate it is ſmooth; and laſtly, he perceived upon ſome of them black ſpots, which, when examined with a magnifying glaſs, appeared to be covered with mould. Theſe grains were ſeparated carefully, according to their ſeveral conditions, and ſown apart, though in the ſame ground. All the mouldy grains produced ſmutty ears, the ſhrivelled, the parched, and thoſe that were attacked by inſects, either did not grow at all, or did not produce any ſmut.

"He then ſingled out a parcel of ſound grains, ſowed them, and ſome time after took them up in order to examine them again with a magnifying glaſs. He found ſome of them mouldy, replanted them all, and obſerved that the mouldy grains produced ſmutty ears.

"M. Aimen, without pretending that this is the only cauſe of the ſmut of corn, concludes from theſe experiments, that mouldineſs is a cauſe of this diſtemper.

"It is very hard to conceive how mouldineſs can produce this diſtemper; for as ſoon as the ſeed has ſprouted and produced its plant, the whole ſubſtance of the grain is conſumed. Whether the hulls or coverings grow mouldy or not, ſeems to be a circumſtance quite immaterial to the plant, which ceaſes from that time to ſubſiſt on what the ſeed had ſupplied it with till then. We readily conceive that if this mouldineſs attacks the plant, it might either kill it or render it poor and weak: but we cannot imagine how this mouldineſs ſhould affect only the organs of fructification, and entirely deſtroy them, without doing any viſible injury to the other parts of the ſame plant, even though it be a perennial. However, M. Aimen relates facts; to account for which one might conjecture, ſuppoſing the increaſe of plants to be only an extenſion of the embryo, that the organs of fructification which exiſt in imperceptible miniature in the ſeed, were already affected by the mouldineſs before the grains were depoſited in the earth. But let us abide by well obſerved facts: it being of more importance to collect them, than to be in a hurry to explain them by conjectures hitherto attended with little probability.

"Means of preventing this diſtemper.—M. Aimen is of opinion, that, to prevent this diſtemper, the fineſt and ripeſt corn ſhould be choſen for ſeed, that it ſhould be threſhed as ſoon as poſſible, and that it ſhould be limed immediately after, as well, ſays he, to keep it from growing mouldy, as to deſtroy the mould already formed, if any ſuch there be; adding, that every method he has tried to make corn ſo prepared grow mouldy, has been ineffectual, and that he has never known it produce ſmutty ears."

According to this principle, the preparations which have been experienced to be ſerviceable in the caſe of burnt-grain, and particularly M. Tillet's lye, may be equally beneficial to guard againſt ſmut. But we ſhall not attempt, continues M. Duhamel, to make any addition to M. Aimen's advice, becauſe we have not ſtudied the diſtemper properly called ſmut, ſo much as we have that far more dangerous one which we diſtinguiſh by the name of burnt-grain. According to ſome experiments made by M. Tillet, the black powder of ſmutty corn does not appear to be contagious. However, we ſhould ſpeak more affirmatively on this point, if we had been able to collect a ſufficient quantity of that powder: but, as was ſaid before, the wind and rain carry it away, and but very little of it is found in granaries. We exhort thoſe who wiſh to contribute to the progreſs of agriculture, to make farther trials, in order to aſcertain whether the ſmut of corn be really contagious or not: but at the ſame time we caution them to be careful not to confound this diſtemper with the uſtilago, or burnt-ear; for want of which diſtinction ſeveral philoſophers have hitherto been miſled.

As weak plants are moſt ſubject to ſmut, M. Aimen recommends good tillage, as a ſure means of giving them ſtrength and vigour. It is probably for this reaſon that corn is very ſeldom ſmutty when managed according to the New Huſbandry.

He obſerves, that all the lyes generally made uſe of, preſerve the plants from mouldineſs; and of all of them, lime ſeems to him the moſt effectual.

"M. de Lignerolle ſays, that the ſureſt means of avoiding ſmut, and that which he has practiſed with ſucceſs ever ſince the year 1739, on upwards of three hundred acres of land, is, to change the ſeed every year, to be very careful that the ſeed-corn be well dried and thoroughly ripe, and that it be not ſmutty, nor have any ſmutty powder ſticking to it. He then pours boiling water on quick lime, in a large tub; and after the ebullition is over, as much cold water as there was hot, and ſtirs it all ſtrongly together, in order to diſſolve and thoroughly mix the lime. The quantity of wheat intended to

to be ſowed is ſprinkled with this lye, and then well ſtirred with a ſhovel, and laid in as high a heap as poſſible. It is beſt to keep the grain for a week after this preparation, turning it every day; for otherwiſe it would heat ſo as to deſtroy the germ. By theſe means he has not had any ſmut, when the fields around him have been infected with that diſtemper.

"M. Donat, near Rochelle, thinking the ingredients commonly employed in ſteeps too dear for the uſe of farmers, ſtudied for ſome years to find out ſomething cheaper, eaſy to be had every where, and therefore better calculated to be of general uſe. "I have had, ſays he, in a letter to M. Duhamel, the good fortune to accompliſh what I wiſhed; for I now uſe only pigeons-dung, quick lime, aſhes, and ſea-ſalt, where this laſt can be conveniently had. I have ſometimes made with theſe ingredients, ſteeped in water, ſo ſtrong a liquor, that it has even deſtroyed the germ of the grain. But there will be no danger of that, if care is taken to obſerve the following directions, which are the reſult of ſeven years ſucceſsful experience, even at times when farmers who have neglected to follow my example, have had ſuch wretched crops as have not paid the charge of reaping.

"Take quick-lime and pigeons dung, of each twenty-five pounds, forty pounds of wood-aſhes, and twenty-five pounds of ſea-ſalt, or ſalt-petre. Put all theſe into a tub large enough to hold half a hogſhead of common water added to them. Stir them all well with a ſtick, till the lime is quite diſſolved. This lye will keep ſome time without ſpoiling. It muſt be ſtirred again juſt before the corn is ſteeped in it. The grain is then put into a baſket, and plunged in the lye, where it remains till it has thoroughly imbibed it; after which it is taken out, and laid in a heap, till it is quite drained of all its moiſture: or, which is a ſtill better way, take a waſhing-tub, fill it with grain to within four inches of the brim, and then pour in the lye well ſtirred before hand. When the tub is full, let the lye run out at the bottom, into ſome other veſſel, in order to uſe it again for more corn. Let the grain be then taken out and laid in a heap to drain; and continue in this manner to ſteep all your ſeed-corn. The wheat thus prepared may be ſowed the next day, and muſt not be kept above five or ſix days, for fear of its heating. This I ſay from experience. The quantity of lye above preſcribed, will ſerve to prepare more than twenty buſhels of wheat.

"Mr. Tull obſerves, that bringing, and changing the ſeed, are the general remedies for ſmut. The former of theſe, he had heard, was diſcovered about ſeventy years before he wrote, by the ſowing of ſome wheat which had been ſunk in the ſea, and which produced clean corn, when it was a remarkable year for ſmut all over England: but he afterwards doubts whether this might not happen by its being foreign ſeed, and therefore a proper change for our ſoil. He tells us that two farmers, whoſe lands lay intermixed, uſed ſeed of the ſame growth, from a good change of land, and that the one, who brined his ſeed, had not any ſmut, whilſt the other, who neglected that precaution, had a very ſmutty crop—But again he doubts whether this ſeed might not have been changed the year before, and ſo might not be greatly infected; or at leaſt not more than the brine and lime might cure. He adds, that ſmutty ſeed wheat, though brined, will produce a ſmutty crop, unleſs the year prove very favourable; for that favourable years will cure the ſmut, as unkind ones will cauſe it: but, above all, he aſſures us, that the drill-huſbandry is the moſt effectual cure."

"Count Ginanni, a patrician of Ravenna, who has favoured the world with a very accurate and ingenious treatiſe on the diſtempers of corn in the blade, deems the ruſt incurable, after it has once taken place. He has prevented it by ſprinkling the plants, before their ears were formed in their hoods, with a ſolution of ſal ammoniac or ſalt-petre in water mixed with ſalt of tartar, and with other alkaline ſubſtances; but obſerves, that ſuch preparations are too dear for the uſe of farmers. He thinks, that ſowing thin and keeping the corn quite free from weeds, will generally be a good preſervative, as he himſelf has frequently experienced."

"The ſmut in wheat, ſays a writer in the Muſeum Ruſticum, is an evil which has long been complained of, and many methods tried to prevent it, all of which have proved ineffectual, or, at beſt, but a mitigation of the diſeaſe; which methods I need not here enumerate, as they are generally known, or are to be met with in various authors who have wrote on agriculture; ſome of them being calculated to forward vegetation, and ſtrengthen the plant, ſuch it will be adviſable to continue in the practice of.

"But amongſt all the authors who have wrote on this ſubject, I do not remember to have ſeen one who has pointed out a probable conjecture with reſpect to the cauſe of this malady, ſo as to be ſupported by any tolerable degree of reaſon. And inſomuch as natural hiſtory has been and is my favourite ſtudy, (of which I take agriculture and a knowledge of cattle to be no ſmall part) I have frequently employed ſome leiſure hours, to endeavour to aſſign cauſes for various diſeaſes, to which the productions of the earth are ſubject; among which, this of *ſmut in wheat* is one. And being deſirous to improve my knowledge, I am willing to communicate, that if any thing worth notice might come from me, I may have the pleaſure of doing ſomething for the public good, and thereby induce others to make their diſcoveries known, from which myſelf, as well as many more, may reap ſome advantage.

"I remember to have read a little treatiſe, wrote ſome years ſince, by James Logan, (chief juſtice, and preſident of the council of the province of Penſylvania) on the generation of plants, containing obſervations made on the maize, by which he diſcovered the plant to be (what Linnæus calls monoecia, or) a plant bearing male and female flowers, and, as ſuch, capable of being impregnated with a fructifying duſt from another plant of the like kind.

"I own, the reading this pamphlet firſt gave me the hint of the generation of vegetables, from which I continued my obſervations reſpecting other plants, and among the reſt to wheat, and the like; though this is not of the ſame claſs with maize, but of the claſs triandria of Linnæus, and is hermaphodite, yet, nevertheleſs, equally ſubject to be impregnated by duſt from another plant, as well as with duſt from itſelf.

"Having frequently obſerved amongſt wheat, while green, (though ſhot up into ſpindle) ſeveral black, blighted ears, I examined them, and found theſe were ears in which, by ſome accident, the intention of nature was prevented; I ſuppoſe, by being detained too long in the huſe, and by the natural humidity of the plant, a fermentation was promoted in its ear, deſtroying the ſmall

veſſels through which the corns were to receive nouriſhment; by which means their contents became black, dry, and duſty: theſe ears, growing up with the others, imbibe moiſture ſufficient to cauſe the duſty particles in the grains in them to expand, and burſt the fine ſkin which contained them: being thus ſet at liberty, the air, if it happens to be a dry ſeaſon, dries them again; by which means they become light enough to float therein, when ſeparated from the ſkin which held them. If this happens when the wheat is in bloſſom, which it often does, part of the duſt enters the ſtygma of healthy corns, and thereby infects them: the pulp in thoſe becoming black, a fermentation is raiſed therein which deſtroys the life of the grain thus impregnated: hence the diſagreeable ſmell is acquired peculiar to this diſeaſe (the ſmell in a grain of ſmut being the ſame as in a black blighted ear.)

"From hence it is eaſily accounted for, why, often, a few grains in an ear are ſmutty, and the others good.

"Some may perhaps object, if this be the caſe, why are not barley and oats ſubject to the like diſeaſe, ſince both theſe are ſubject to the black blight as well as wheat? Such objectors would do well to obſerve, that theſe have a more tough ſkin than wheat, which does not burſt till after the blowing of theſe ſorts of corn is over; therefore, when it does burſt, the duſt can do no harm.

"Having thus pointed out the cauſe, I now proceed to preſcribe the remedy, which is, when the corn is ſhot into ſpindle, and the ears begin to appear, let ſome perſons go along each furrow in the field, and carefully break off all ears of the black kind, (not pull them up, becauſe often from the ſame root grow ſeveral others, which are good and ſound ears) and when broke off put them into a bag, and carry them away; for ſhould they be thrown on the ground, there may ſtill be danger of infection from them; as, 'tis poſſible, there may be ſome of theſe diſeaſed ears, which are not burſten, and therefore may eſcape being gathered, theſe may be known by the ſtalk at the neck being crooked, and bent in the length of three or four inches backward, and forward five or ſix bends, and the hoſe nearer to the head of ſuch than the ears which are good.

"The ſeaſons in which wheat is moſt liable to be ſmutty are, it is well known, ſuch in which it happens to be dry weather and windy at the time of blowing; but if it happens to be wet during that time, it is very rare to ſee a ſmutty ear in a field." *Muſeum Ruſticum*, *vol.* II. *page* 19.

"As the ſmut in wheat, ſays another writer in the ſame work, is an evil greatly complained of, and not without reaſon, among farmers, I have no doubt but your readers will be well pleaſed to be informed of a means of preventing the damage which is annually experienced in this reſpect.

"As I write from experience, what I communicate may be depended on; and I have great foundation for thinking it will be found of particular ſervice to ſuch of your readers as are practical farmers, and who yet are unacquainted with the method I intend to recommend.

"I have for many years paſt, eſcaped having ſmutty crops, by a proper care of the ſeed-wheat before it is put into the ground; and the method I purſue, though efficacious, is in itſelf ſimple and cheap.

"I take four buſhels of pigeons dung, which I put into a large tub: on this I pour a ſufficient quantity of boiling water, and, mixing them well together, let them ſtand ſix hours, till a kind of a ſtrong lye is made, which, at the end of that time, the groſſer matter being ſubſided, I cauſe to be carefully drained off, and put into a large keeve, or tub, for uſe.

"This quantity is ſufficient for eighty buſhels of ſeed-wheat.

"My next care is to ſhoot into this ſteep a manageable quantity of my ſeed, which is immediately to be violently agitated, with either birchen brooms, or the rudders that are made uſe of in ſtirring the malt in the maſh-tub in a brewing-office. As the light grains riſe, they muſt be diligently ſkimmed off; and after the ſeed has been agitated in this manner for the ſpace of perhaps half an hour, it may be taken out of the ſteep, and ſown out of hand, with great ſafety: and I can venture to ſay, that if the land is in good heart, and has been properly tilled, it will not, when ſown with theſe precautions, produce a ſmutty crop." *Muſeum Ruſticum*, *vol.* III. *page* 81.

"Another gentleman, who ſigns himſelf a Norfolk farmer, declares he always obſerved, that if the ſeed was well waſhed it never failed: that he took the hint, and waſhed ſome ſeed which he knew to be ſmutty, in a large tub filled with plain ſimple water, ſtirring it violently with birchen brooms, taking care from time to time, to ſkim off the light. This anſwered very well, and he has ever ſince continued the practice.

"I read, ſays another gentleman, the above account with ſome degree of ſatisfaction, but am ſorry that your correſpondent ſhould be ſo much a lover of brevity, as to ſay no more upon a ſubject of ſuch infinite importance.

"The truth is, we Engliſh farmers have hitherto known very little of the nature of this diſeaſe in wheat, imagining that whenever the corn was black it was infected with the ſame diſorder; but this is far from being the caſe, as any of your readers may ſee, by referring to a piece written by Monſ. de Gonfreville of Normandy, publiſhed in the ſecond number of the Foreign Eſſays on Agriculture, &c. (which I cannot but eſteem a very uſeful work) and containing a detail of a number of experiments made by the above gentleman to aſcertain the cauſe of the ſmut.

"I was not a little pleaſed to find that the method preſcribed in this invaluable Eſſay, for guarding againſt this diſtemper, does not materially differ from that above recommended.

"Both theſe gentlemen depend on the clean waſhing of the ſeed, and the trials of both met with the wiſhed-for ſucceſs."

We ſhall conclude this article with the following method of preventing this deſtructive diſtemper, ſent us by the ingenious Mr. Bromwell Powell, of Green's Forge, near Stourbridge in Worceſterſhire, dated September 1766.

"I have here, ſays he, ſent you an infallible remedy againſt the ſmut in wheat, a thing ſo prejudicial to the community in general, and which I myſelf have made uſe of for ſeveral years paſt, and have ſown ſmutted wheat, prepared as under directed, and have not had one ſmutted ear from the produce; and am well aſſured if the farmers will obſerve the under direction, they never will have any. Now as the coating of wheat with brine and lime, is ſo well known to the farmers in general, I need ſay no more on that ſubject, as you have directions from

from many authors concerning it: but when wheat is ſo prepared with brine and lime as is uſual, then to every ſtrike of wheat ſo prepared, add one pound and a half of red lead, by putting it into a cullinder and ſhaking it gently over the prepared corn, and ſometime ſtirring the corn with a ſhovel, that every corn may have a ſpot or two of the lead adhere to it, which when ſo done is an effectual preſervative againſt the above malady, nor will any fowls lie upon it after ſo prepared.

"By the above method ſeveral of the penurious farmers will look upon it to be a great expence, as the lead will coſt, bought in ſmall quantities, three-pence per pound; but admit every ſtrike was to coſt ſix-pence per ſtrike, it would greatly anſwer the farmer's purpoſe; I therefore have ordered as ſmall a quantity as can be complied with; but if more was added it would ſtill be a greater preſervative. As the time of ſowing is now near at hand, I hope the gentlemen will apply to ſome farmer, whom they can depend upon to try the experiment of one ſtrike ſo prepared; and, if they can readily procure it, let half a ſtrike of it be ſmutted corn when ſown, and to that half ſtrike would adviſe one pound of the lead to be applied, which will be a convincing proof of the utility of the above."

SNAIL-COD, or *Snag-greet*, a name given by Mr. Worlidge, to a ſpecies of manure, found at the bottom of deep rivers. It is a kind of mud or ſludge, very ſoft, full of wrinkles, and intermixed with many little ſhells and ſnails, to which it is thought to owe a great part of its fatneſs.

SNATHE, the handle of a ſcythe.

SOAP-ASHES. *See* ASHES.

SOIL, a general name for all ſorts of land. *See the article* EARTH *and* GROUND.

Soils are divided by our farmers into nine ſorts, viz. the ſanday, the gravelly, the chalky, the ſtony, the rocky, the hazely, the loamy, the marſhy, and the clayey. *See the article* SAND, GRAVEL, CHALK, &c.

SOOT, a ſuliginous ſubſtance formed in chimnies.

Soot, either of vegetables or of coal, is good both for corn and graſs, eſpecially on cold moiſt grounds, or lands apt to over run with moſs. Many have found their account in ſtrewing it early over their green wheat and barley: but Mr. Ellis ſays neither of them ought to be ſooted after the 25th of April, becauſe the wheat, and generally the barley, have then done gathering and branching, and are upon the ſpindle. He likewiſe thinks it proper to be ſown over young turnips, juſt after they have appeared. But care ſhould always be taken not to ſtrew it too thick, leſt its hot nature ſhould hurt the plants. Mr. Worlidge ſeems to think wood-ſoot the beſt: but Mr. Mortimer prefers that which is made from ſea-coal, of which about forty buſhels are commonly allowed to an acre; though ſome grounds will require more: to which he adds, that it produces a very fine ſweet graſs, and deſtroys worms and weeds; and that it ought not to be ſown upon wheat till Candlemas, becauſe the long cold rains and ſnows are apt to waſh it in too ſoon: nor is it ſafe to lay it on later, leſt a drought ſucceed and burn it up. *See the article* COAL-SOOT.

SOUR LAND, a cold clayey ſoil. *See the article* CLAY.

SOW, the famale of the ſwine. *See* HOG.

SOWING, the action of ſcattering the ſeeds of plants in the ground.

Writers of different countries mention the uſual ſeaſons for ſowing their ſeveral kinds of grain, but do not take notoice of any ſign by which the huſbandman may be directed when to ſow his corn with the greater chance of ſucceſs. For a rule of this kind we are indebted to the juſtly celebrated Linnæus, a man truly great, not only for his unequalled knowledge in natural hiſtory, and his indefatigable induſtry in the purſuit of that ſcience; but even ſtill more ſo for his diſintereſted zeal to turn the reſult of his ſtudies to the advantage of his country. Far ſuperior to that mean jealouſy which little minds are apt to entertain on their diſcoveries, he nobly calls forth every aſſiſtant, and invites each of them to become his rival in promoting the general welfare of mankind, as we are particularly informed by one of his diſciples.

"It is now the fourth year, ſays the ingenious Mr. Harald Barck, a member of the Swediſh academy, ſince our illuſtrious preſident exhorted his countrymen to obſerve with all care and diligence, at what time every tree expands it buds, and unfolds its leaves; imagining, and not without good reaſon, that our country would, ſome time or other, reap ſome new, and perhaps unexpected benefit, from obſervations of this kind made in different places."

As one of the apparent advantages, he adviſes "the prudent huſbandman to watch with the greateſt care the proper time for ſowing; becauſe this, with the divine aſſiſtance, produces plenty of proviſion, and lays the foundation of the public welfare of the ſtate, and of the private happineſs of the people. The ignorant farmer, tenacious of the ways and cuſtoms of his anceſtors, fixes his ſowing ſeaſon generally to a month, and ſometimes even to a particular day, without conſidering whether the earth be prepared to receive the ſeed: from whence it frequently happens, that the fields do not return what might be expected, and that what the ſower ſowed with ſweat, the reaper reaps with ſorrow. The wiſe œconomiſt ſhould therefore fix certain ſigns whereby to judge of the proper time for ſowing. We look up to the ſtars, and without reaſon, ſuppoſe that the changes on earth will anſwer to the heavenly bodies; entirely neglecting the things which grow around us. We ſee trees open their buds and expand their leaves, from whence we conclude that ſpring approaches, and experience ſupports us in this concluſion: but no body has hitherto been able to ſhew what trees Providence intended to be our calendar, ſo that we might know on what day the countryman ought to ſow his grain. No one can deny but that the ſame power which brings forth the leaves of trees, will alſo make the grain vegetate; nor can any one juſtly aſſert that a premature ſowing will always, and every where, accelerate a ripe harveſt. Perhaps therefore we cannot promiſe ourſelves a happy ſucceſs by any means ſo likely, as by taking our rule for ſowing from the leafing of trees. We muſt, for this end, obſerve in what order every tree puts forth its leaves, according to its ſpecies, the heat of the atmoſphere, and the quality of the ſoil. Afterwards, by comparing together the obſervations of ſeveral years, it will not be difficult to define, from the foliation of trees, if not certainly at leaſt probably, the time when annual plants ought to be ſown. It will be neceſſary likewiſe to remark what ſowings made in different parts of the ſpring produce the beſt crops, that by comparing theſe with the leafing of trees, it may appear which is the moſt proper time for ſowing; nor will

it be amiſs in like manner, to note at what times certain plants, eſpecially the moſt remarkable in every province, blow; that it may appear whether the year makes a quicker or ſlower progreſs. In upland, the ſowing of barley nearly coincides with the foliation of the birch.

Mr. Stillingfleet, who has given us a judicious tranſlation of ſome ſelect pieces publiſhed by ſeveral ingenious members of that great, and hitherto unrivalled ſchool of natural hiſtory, the univerſity of Upſal in Sweden, under the preſidence of the excellent Linnæus, was told by a common huſbandman in Norfolk, that when the oak catkins begin to ſhed their ſeed, it is a proper time to ſow barley: "and why," adds he, very properly, "may not ſome other trees ſerve to direct the farmer as to other ſeeds. The prudent gardener never ventures to put his houſe plants out, till the mulberry leaf is of a certain growth." Heſiod, continues this gentleman in his ingenious note on M. Barck's foliation of trees, began to fix the proper ſeaſons for plowing, ſowing, &c. by the appearance of birds of paſſage, or of inſects, or by the flowering of plants; but I do not find that this method was ever after attended to till Linnæus wrote. Heſiod ſays, that when the voice of the crane is heard over-head, then is the time for plowing; that if it ſhould happen to rain three days together when the cuckow ſings, late ſowing will then be as good as early ſowing; that when ſnails begin to creep out of their holes, and climb up the plants, it is time to leave off digging about vines, and take to pruning. There is a wonderful coincidence, which probably takes place in all countries, between vegetation and the arrival of certain birds of paſſage. Linnæus ſays, that the wood-anemone (in Sweden) blows from the arrival of the ſwallow: and Mr. Stillingfleet finds by a diary which he kept in Norfolk for the year 1755, that the ſwallow appeared there on the 6th of April, and the wood-anemone was in bloom on the 10th of the ſame month. Linnæus obſerves, that the marſh-marygold blows when the cuckow ſings; and Mr. Stillingfleet finds by his diary, that the marſh-marygold was in bloſſom on the 7th of April, and the cuckow ſung the ſame day.

A due temperature of the ſeaſon, with reſpect to heat or cold, drought or wet, for all theſe greatly influence the ſtate of the earth, is eſſentially neceſſary, and ſhould be carefully attended to by the huſbandman when he ſows: but the preciſe time moſt proper for this work, cannot, by any means, be invariably fixed, becauſe it will always depend on the concurrence of a variety of circumſtances. The ſeaſons are more or leſs forward, and the ground is more or leſs dry, in ſome years, than in others. A proper ſeries of well made obſervations would furniſh the beſt of rules in this reſpect, but certainly would not fix the time of ſowing to any particular day, or week, for years to come. Linnæus's method, of carefully obſerving the foliation of trees, &c. would determine the proper time for ſpring ſowing; and Pliny, after mentioning the ſeveral conſtellations by which farmers were guided in his time, inſtructs the huſbandman with regard to autumnal ſowing, upon a principle ſimilar to that of our great modern naturaliſt. "Why," ſays he, "does the huſbandman look up to the ſtars, of which he is ignorant, whilſt every hedge and tree point out the ſeaſon by the fall of their leaves? This circumſtance will indicate the temperature of the air in every climate, and ſhew whether the ſeaſon be early or late. This conſtitutes an univerſal rule for the whole world; becauſe trees ſhed their leaves in every country according to the difference of the ſeaſons. This gives a general ſignal for ſowing; nature declaring, that ſhe has then covered the earth againſt the inclemency of the winter, and enriched it with this manure."

I therefore can only ſay, in general, that it is better to ſow early in autumn, than too late, provided the ſeaſon will admit of it; becauſe the plants are better able to reſiſt the ſeverity of the winter, after they have acquired a certain degree of ſtrength; and their roots being then longer, and conſequently better fixed in the earth, they will be leſs liable to be thrown out by froſt. For this reaſon, in particular, perhaps the colder the climate is, the earlier the wheat ſhould be ſowed. Some lands are of ſuch a nature, that they ſwell greatly in hard froſts, and ſubſiding again upon a thaw, leave the roots of plants quite bare upon their ſurface. There have, indeed, been years in which fields ſowed very late, for inſtance in December, have done extremely well: but that ought not, on any account, to be made a rule, experience ſhewing that ſuch late ſowings very ſeldom anſwer. On the other hand, the corn is likewiſe expoſed to many dangers when ſowed too early: for the ſtalks which ſhoot up before winter cannot well bear hard froſt, though wheat would not be hurt by them when only in the blade.

M. de Chateauvieux, than whom we cannot have a better guide, is clearly of opinion, that though the proper time of the year for ſowing be come, the corn ſhould not be put into the ground if the temperature of the ſeaſon be not favourable, and that on the contrary the ſowing of it ought to be deferred, in hopes of a change. "If, ſays he, the weather is very hot, and the earth extremely dry, it will be abſolutely neceſſary to wait till ſome rain has fallen; for otherwiſe the ſeed will riſe but very imperfectly. This I am ſure of, by which I contradict the common ſaying of ſome farmers, that the earth is the beſt granary to keep the corn in. Full of this notion, whenever the ſtated times comes round, they ſow without diſtinction, in wet land or in dry: even heat does not hinder them: they think their ſeed will certainly ſprout well after the firſt rain; but I have always experienced that the plants have come up thin.

"To ſatisfy myſelf ſtill farther in this point, I tried an experiment, purpoſely to know whether corn can be ſowed with any reaſonable expectation of ſucceſs, when the weather is very hot, and the earth very dry. Upon reading M. Duhamel du Monceau's excellent Treatiſe on the Preſervation of Corn, I obſerved, that he had found by his experiments, that wheat dried in a ſtove heated to ſixty degrees of M. de Réaumur's thermometer, had loſt its faculty of growing. From thence I conjectured, that wheat which ſhould undergo a heat, for example, of thirty degrees during a longer time, would be equally parched up, and rendered incapable of vegetating. I conſidered the earth, when hot and dry, as a kind of ſtove, in which the ſeed, if it remain too long without receiving any moiſture, may become ſo dry, that the greateſt part of it will never be able to ſprout. This reaſoning is juſt, and I therefore determined to have recourſe to that truſty guide, experience.

"On the 18th of July, 1754, at four o'clock in the afternoon, I placed M. de Réaumur's thermometer two inches deep in the earth, and ſcreened it from the immediate impreſſion of the rays of the ſun. The liquor roſe to the thirty-firſt degree, which ſhewed me the heat of the earth.

"The

"The thermometer being afterwards expoſed to the ſun, the liquor roſe to thirty-ſix degrees.

"The ſame day, I ſowed eighty grains of wheat in this ground. The heat continued near the ſame during the reſt of that month, and almoſt all Auguſt. On the 21ſt of July, only ten grains had ſhot up, and on the 16th of Auguſt there were in all ſixteen; after which not one more roſe; conſequently ſixty-four grains out of the eighty never ſprouted at all.

"On the 28th of July I ſowed fifty grains. Only four of them roſe by the ſixteenth of Auguſt, and not one after. Here were again forty-ſix grains which did not grow at all.

"The ſame day, I ſowed ſixty grains in another place. On the ſixteenth of Auguſt only ſix grains had ſprouted, and not one plant more ever appeared after: conſequently here too were fifty-four grains which never grew. All theſe grains were ſowed in my garden, in exceeding good mould.

"I was ſure that the wheat which I ſowed was perfectly ſound, and in every reſpect capable of growing. It was therefore quite clear, that ſo great a number of grains out of the whole, which did not ſprout at all, had loſt the faculty of growing, by their being parched up by the heat and dryneſs of the earth. To be ſtill more certain of this three weeks after I had ſowed theſe grains, I watered half of them ſeveral times; but to no purpoſe: not one of them roſe, and I found ſeveral of them quite whole in the earth where I had ſowed them.

"After this experiment, on the 11th of Auguſt I ſuſpended the ſowings I had begun on the 8th, and did not reſume them till the 26th, after ſome rain which fell on the 22d and 23d. Theſe laſt ſowings roſe much better than the firſt.

Upon the whole, M. de Chateauvieux concludes from his own repeated practice, that the beſt time for ſowing in ſuch a climate as Geneva, (which differs very little from ours) is from the 20th of Auguſt to the end of September: and thinks that even the firſt fortnight in October may be taken in, if the land cannot poſſibly be ſowed ſooner But he allows of this only in a caſe of neceſſity, and judges that, rather than ſow later, it is beſt to ſtay till ſpring.

"Thus, ſays he, it is that experience and obſervation teach us to leave off bad cuſtoms, or ſuch as are not founded on principles with which a man of ſenſe may reſt ſatisfied.

It is of the greateſt conſequence to the farmers that every ſeed be placed in the earth at a proper depth, and in the beſt manner: but experiments are yet wanting to determine with due exactneſs, what is the depth which beſt ſuits each kind of grain, in different ſoils.

The method which Mr. Tull propoſes, is a very good and eaſy way to aſcertain this point for each particular ſowing. Saw off twelve ſticks, of about three inches diameter; bore a hole in the end of each ſtick, and drive into it a taper peg; let the firſt peg be half an inch long, the next an inch, and ſo on; every peg to be half an inch longer than the former, till the laſt peg be ſix inches long; then in that ſort of ground, where you intend to plant, make a row of twenty holes with the half-inch gauge; put therein twenty good ſeeds; cover them up, and then ſtick the gauge in the end of that row; then do the like with all the other eleven gauges: this will determine the depth, at which the moſt ſeeds will come up."

Upon the ſame principle, M. Duhamel dug a trench twelve feet long, ſloping it gradually from the ſurface at one end, to the depth of two feet at the other. He then ſowed different ſeeds in this trench, and, having put the earth into its former place, obſerved, 1. That hardly any ſeeds riſe when buried deeper than nine inches: 2. That ſome ſeeds riſe extremely well at the depth of ſix inches; and 3. That other ſeeds do not riſe at all when they are above one or two inchees deep. Experience ſhews, that the ſame ſeeds may be ſowed deeper in a light, than in a heavy ſoil; that grains which lie too deep in the earth to ſpring up in a dry year, may riſe in a warm and moiſt ſeaſon; and that others which are buried ſtill deeper in the ground, will ſometimes remain there ſound and unaltered for ten or twenty years, at the end of which they will grow extremely well, and produce their proper plants, if they chance to be brought to the ſurface, by moving the earth, as was mentioned before.

The uſual way of ſowing in broad caſt cannot anſwer all the intentions of placing the ſeed properly in the earth, and muſt be attended with ſeveral inconveniencies; ſuch as the ſeeds becoming the prey of various birds and animals; its being laid ſo ſuperficially, that the ſun often parches it up, or a long continued rain, inſtead of promoting a kindly vegetation, ſoaks into the grains, and burſts them; the ſeed is very unequally ſowed, becauſe of the inequality of the handfuls which different ſowers graſp: and great part of it neceſſarily falls together into hollows, where the ſurface of the ground is at all unequal, &c.

Senſible of theſe diſadvantages, farmers have, eſpecially for their winter grain, adopted the method of ſowing under furrow, that is ſowing one half of the ſeed in broad caſt, and then ploughing it in, and afterwards ſowing the other half, which is covered by harrowing. But this method is alſo liable to almoſt as many objections as the other: for the quantity ſown in each particular ſpot, and the equal diſtribution which ought to take place throughout the whole, cannot but be even more uncertain than in the broad caſt, where the whole is ſowed at once, nor dares the farmer, in this ſowing under furrow, to omit ſowing the ſecond quantity, leſt great part of what has been plowed down be buried ſo deep that it cannot riſe, eſpecially if the ſoil is at all ſtrong.

Another general fault in the common ways of ſowing, is, that too much ſeed is employed; partly, becauſe cuſtom has eſtabliſhed a kind of rule in that reſpect, and partly on account of the allowance which it is neceſſary to make for what the birds eat, and for what lies too deep ever to riſe; circumſtances by which a very great quantity of corn is abſolutely loſt.

Theſe inconveniencies are prevented by the drill, which 1. drops the ſeed at whatever depth and diſtance experience has ſhewn to be fitteſt for the particular kind which is ſowed; 2. fills all the furrows with earth, ſo that none of the grain remains uncovered; and 3. lets fall into each furrow the exact quantity of ſeed which has been found to be moſt proper. By this means every ſeed is ſo rightly placed in the earth, that we may be confident they will all do well, if they are not hurt by inſects. But as this inſtrument ſows only the abſolutely neceſſary quantity of ſeed, the huſbandman ought to be certain of the growth

of every grain: becauſe it often happens, that part of the ſeed is imperfect and does not ſprout at all. As the eye cannot diſtinguiſh its quality, he ſhould aſſure himſelf of it, by previouſly ſowing fifty or an hundred grains taken by chance, but exactly counted: when theſe ſpring up, the number of plants will ſhew what proportion is deficient, and the quantity of the ſeed ſhould be increaſed accordingly. To know what ſpace ſhould be left between each ſeed thus planted in the furrow, for that ſpace ought to be different according to the nature of the plant, it will be neceſſary to obſerve how much ground a ſtrong and vigorous plant of the ſame kind takes up when arrived at its greateſt perfection, which it will moſt probably attain when cultivated according to the New Huſbandry; and the drill may then be ſet ſo as to drop each grain at a due diſtance.

Beſides leaving ſtated diſtances between each of the ſeeds which the drill depoſits in the furrow, a farther eſſential object in the New Huſbandry, is to leave proper ſpaces between the rows of corn, which, in this method, are ſowed with the greateſt regularity, nearer together, or farther aſunder, according to the nature of the plants intended to be cultivated. Some do beſt in ſingle rows, others in double, others again in triple rows, and others in quadruple; as will hereafter be more fully ſhewn by ſeveral experiments. *See the article* DRILL-PLOUGH.

SOW-THISTLE, a ſpecies of thiſtle common in cornfields and paſtures.

SPADE, a well known inſtrument uſed in digging.

SPANCEL, a rope to tye a cow's hinder legs.

SPATLING-POPPY. *See* CHICKWEED.

SPARSED-LEAVES, are thoſe which are placed irregularly about the ſeveral parts of a plant.

SPAVIN, a diſeaſe in horſes, being a ſwelling in or near ſome of the joints, and cauſes a lameneſs.

There are two kinds of ſpavins, called a blood-ſpavin, and a bog-ſpavin.

A blood-ſpavin is a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted with reſtringents and bandage, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and frequently will remove this diſorder, if early applied: but if, by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and wax thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe, the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together.

A bog-ſpavin is an encyſted tumor on the inſide the hough, or according to Dr. Bracken, a collection of browniſh gelatinous matter, contained in a bag, or cyſt, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloſes it, forming the cyſt: this caſe he has taken the pains to illuſtrate in a young colt of his own, where he ſays, When the ſpavin was preſſed hard on the inſide the hough, there was a ſmall tumor on the outſide, which convinced him the fluid was withinſide the joint; he accordingly cut into it, diſcharged a large quantity of this gelatinous matter, dreſſed the ſore with doſſils dipped in oil of turpentine, putting into it, once in three or four days, a powder made of calcined vitriol, allum, and bole: by this method of dreſſing, the bag ſloughed off, and came away, and the cure was ſucceſsfully compleated without any viſible ſcar.

This diſorder, according to the above deſcription, will ſcarcely ſubmit to any other method, except firing, when the cyſt ought to be penetrated to make it effectual; but in all obſtinate caſes that have reſiſted the above methods, both the cure of this, and the ſwellings called wind galls ſhould, I think, be attempted in this manner. If, through the pain attending the operation or dreſſings, the joint ſhould ſwell and inflame, foment it twice a day, and apply a poultice over the dreſſings till it is reduced.

SPAYING, the operation of caſtrating the females of ſeveral kinds of animals, as ſows, bitches, &c. to prevent any farther conception, and promote their fattening.

It is performed by cutting them in the mid flank, on the left ſide, with a ſharp knife or lancet, taking out the uterus, and cutting it off, and ſo ſtitching up the wound, anointing the part with tar, and keeping the animal warm for two or three days. The uſual way is to make the inciſion aſlope two inches and a half long, that the fore finger may be put in towards the back to feel for the ovaries, which are two kernels as big as acorns on both ſides of the uterus, one of which is drawn to the wound, the ſtring thereof cut, and thus both taken out.

SPELT, the name of a ſpecies of grain, which though commonly reckoned a ſummer corn, is ſowed either in autumn, or in the ſpring, at the ſame time as wheat and rye. This grain, of which there are two ſorts, one with a ſingle, and the other with a double chaff, though both have always two ſeeds in each huſk, was formerly much eſteemed in Italy and Egypt, and is now very common in Germany, where they make of it bread, which is very nouriſhing, and well taſted, but hard to digeſt. They likewiſe brew beer from it in ſome places. It was of this grain that the ancients made their frumenty, of which they were very fond. Though commonly ranked as a ſpecies of wheat, which it is not unlike when growing, its grain is ſmaller and of a blackiſh hue, its ſtalk thinner and leſs firm, and its ear flat and bearded, with ſeeds only on each ſide. Some writers diſtinguiſh a third ſort, by the name of white-rye, which they take to be the olyra of the Greeks and Latins; and ſeems to be what Mr. Mortimer calls tritico-ſpeltum, a ſort of naked barley, or wheat barley, cultivated in Staffordſhire, ſhaped like barley, but with a grain like wheat. It is much ſown at Rowley, Hamſtal, and Redmore, where they call it French barley. It makes good bread, and good malt, and yields a great increaſe; and therefore would do well to be tried in other places. It ripens early, does beſt in a dry ſoil, and is not apt to be much hurt by birds, from which its beard and double huſk preſerve it.

SPIKY-ROLLER, a very uſeful inſtrument in huſbandry, lately introduced by the ingenious Mr. Randall, of York, who has alſo obliged the world with the following account of it.

"I think, ſays Mr. Randall, it was in the ſpring of 1752, when I had fifty acres of ground, deſigned to be ſowed with barley, at one particular farm; but the weather had been ſo unfavourable, and the ſpring ſo extremely dry, that there was no ſuch thing as preparing the ground for the reception of the ſeed: and this was the caſe with the whole country, in theſe parts of England. On looking, one morning, at a barley roller, which laid juſt before me, I recollected, that Mr. Ellis, in one of his eight volumes

Fig. 1.

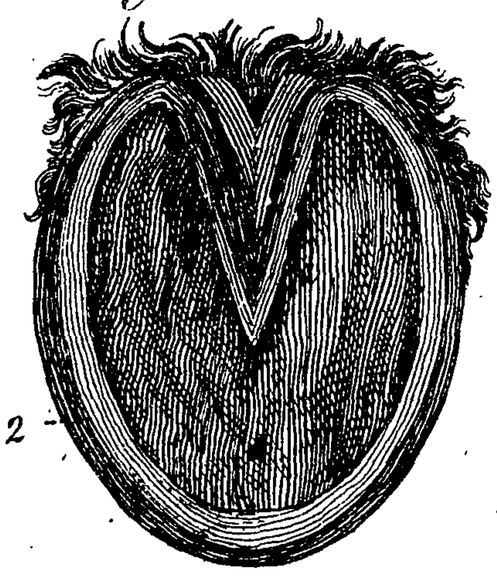
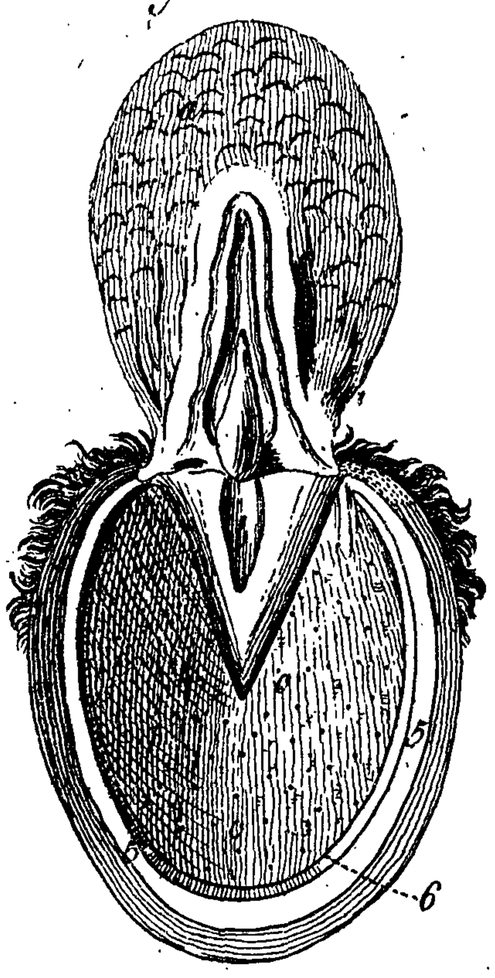
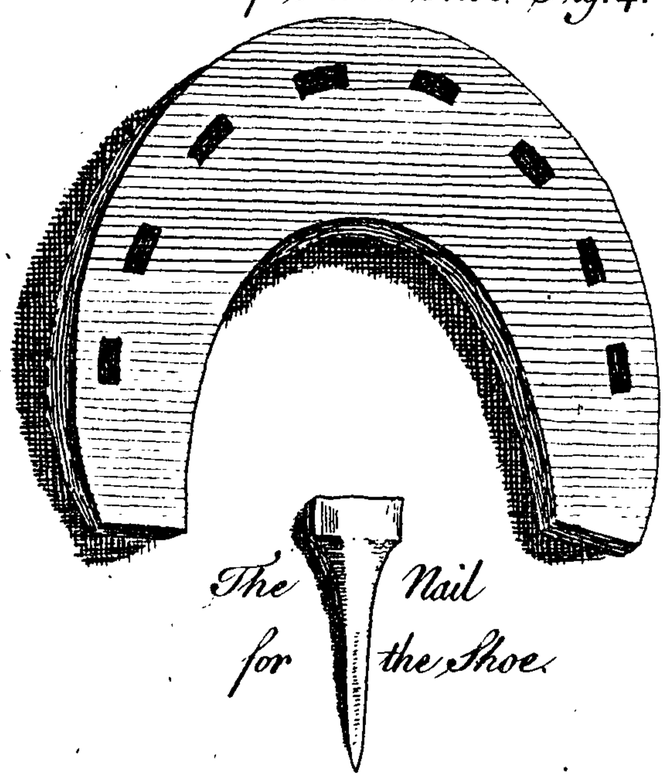


Fig. 2.



The new half Moon Shoe. Fig. 4.



The Nail for the Shoe.

Fig. 5. Spiky-Roller.

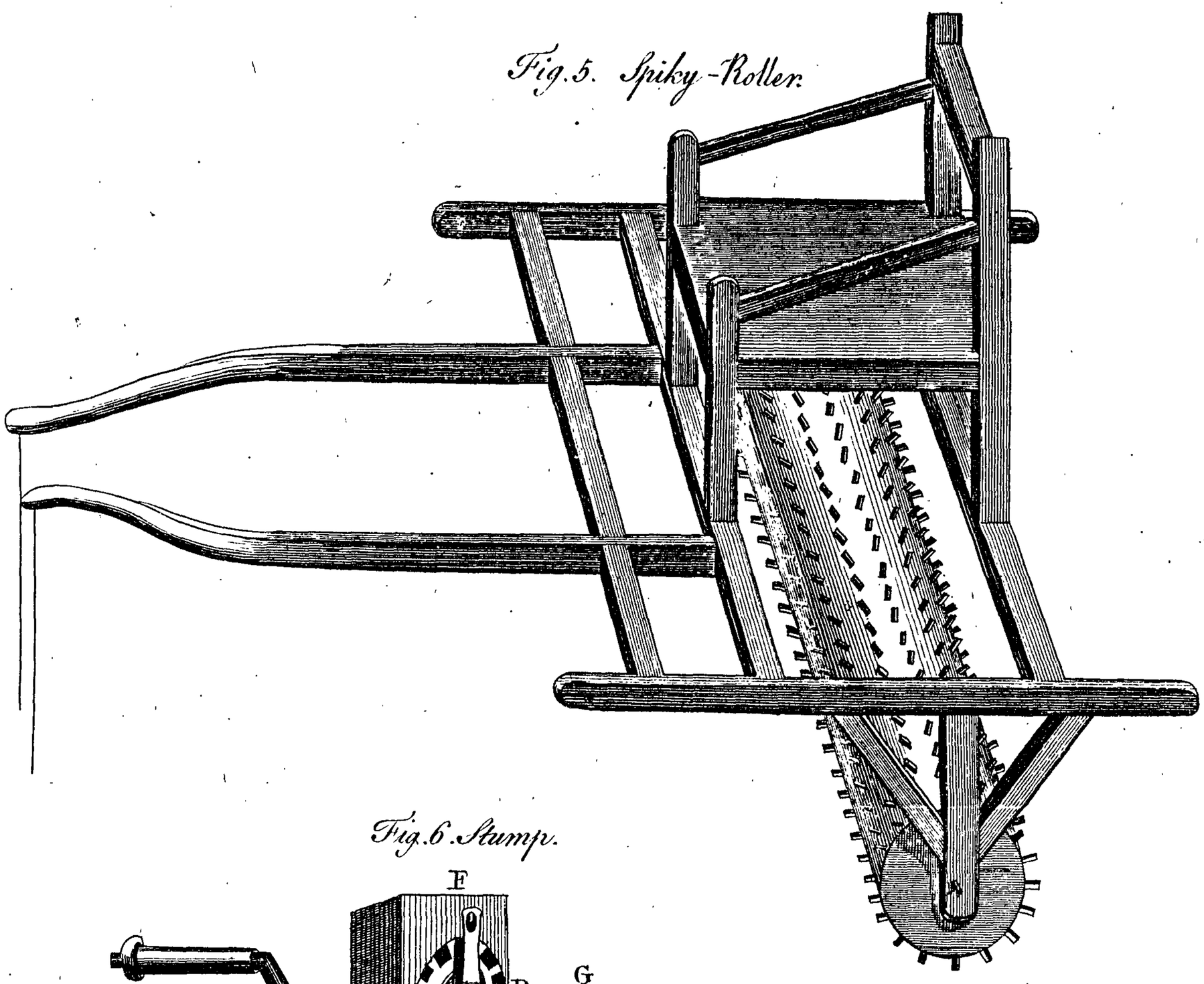


Fig. 6. Stump.

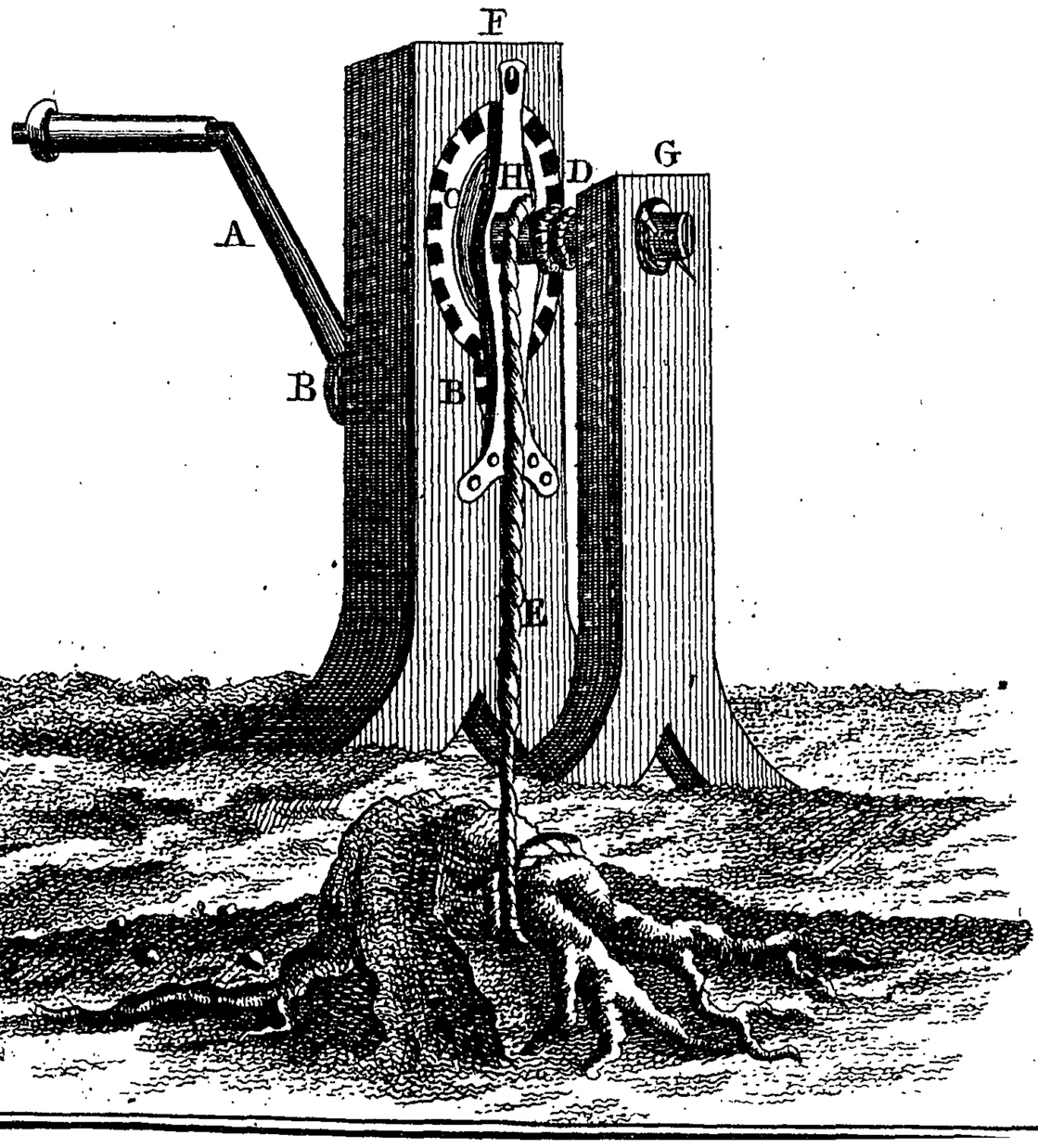
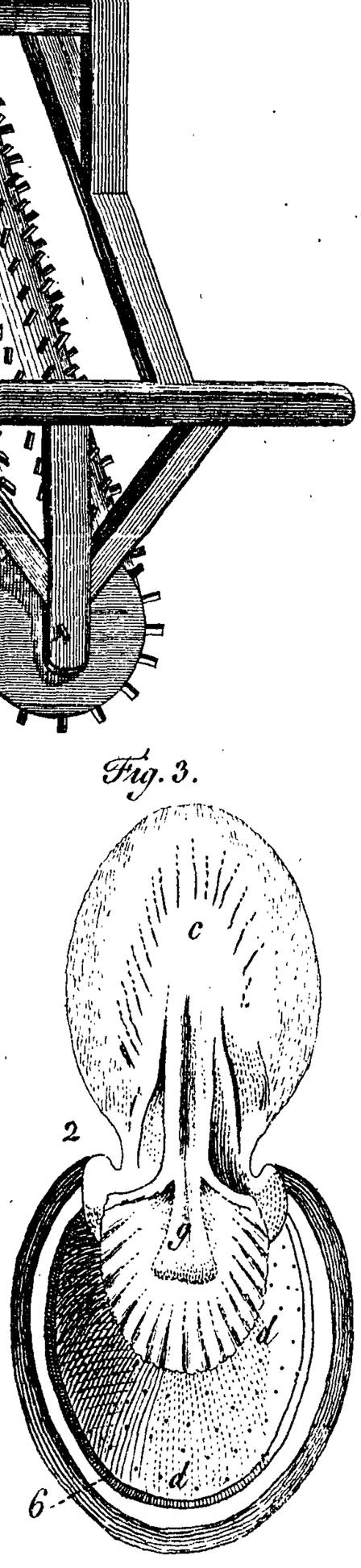


Fig. 3.



volumes in Husbandry, made mention of a spiky roller, and referred the reader to another volume for its plate and description, which were no-where to be found. I immediately sent for some workmen, and produced this useful instrument against the next morning, as the season was far spent, and much ground was to be sowed, in several farms, with this grain.

"On this morning, a neighbouring, substantial farmer, passed by us, with half the country for clotters, as we were going to put the horses to the roller, as he had no longer patience to wait for rains, to reduce the rough state of his ground, designed for barley seed: he gazed at the roller, smiled, and went his way with his troop. They, after clotting two acres, all returned the same way at night; their master rolled his eyes all over a field of about twenty acres, saw it perfectly fine (as the roller came back upon the same ground it went down,) and, after a pause, said, that was a good hedgehog, for doing ten times more in one day than all his troop together, and ten times finer, than a thousand clotters could do in the same time. This was the first time this farmer ever could be brought to say a civil thing of any useful instrument, though common sense would pronounce the utility of this on his first seeing it; but the truth is, nothing but such glaring effects can ever convince these people, as they have the great art of despising what they do not understand, or have not had in practice for ten centuries.

"While the same man was going over the other ground that stood in equal need of the roller, the ploughs were set on to turn up the ground he had rolled; and when all was thus ploughed, the roller went again over the whole, to crush the clots, thus turned up, and made all as fine as before, by going twice in a place: then they ploughed for a seed furrow, sowed the seed in the usual way, and harrowed it in; then the roller with a thorn bush fastened behind, went over again, once in a place, and left all exceeding fine, which even would not have disgraced a gardener in his manner of preparing the ground for the garden culture in general.

"The consequence of this lucky hit, was, that, before the country could get their seed into the ground, my barley was fairly up, went forwards, and did extremely well; while, in general, my neighbour's barley made but a sorry appearance, arising from the rough state of the ground which they could not bring into that fine order this grain requires, notwithstanding all their toil and expence. This atchievement of the spikey roller established its reputation among the neighbouring farmers; but still they could not prevail on themselves to be at the expence, which indeed was not small, in having one made for their own use. The result of all was, that I had other rollers made for the ground in other parts belonging to me, only they were made heavier, and both longer and larger, the better to suit the soils that were much stiffer.

"From this time we never sowed any seed in the common form, but the spiky roller and thorn bush at its tail, followed the harrows; as it effectually buried the seed, and left the ground in a fine state. It may easily be conceived, that this operation is of consequence to vegetation: for the fine mould, being thus swept into the holes made by the irons, and where the seed was buried, must needs greatly promote their growing soon, and nourish them well above-ground; as it is well known, the finer the mould is, where the seed is deposited, there vegetables are pushed on to their destined maturity, if all other requisites concur. And upon this principle it is, that if the corn in the spring is rolled once in a place in like manner, the owner will be far from having any cause to complain of the practice, provided the weather and state of the ground, will or ought to bear the tread of the horses, and weight of the spiky roller.

"I am very sensible this will appear strange to many persons, as it looks like sending a herd of rapacious wolves to nourish a flock of tender lambs, or tearing, bruising, and throwing all the corn up from their very roots, and bringing on a general desolation over all the ground. This is like Sisyphus in Homer: we crop the ground with much sweating and tugging, and then suffer all to be destroyed again, by this ponderous, grinning creature. But it may not, perhaps, be ill expressed, when we say, that, in order to come at the truth of things in farming, we must, according to the Greek epigram, ascend downwards, and descend upward: the most triumphant success, in the true bias of nature, in establishing agriculture, rises safely and surely on the foundation laid by bold experiments, that seem to contradict superficial reason.

"Let us now consider the effect of this terrible desolater, as it goes over the young corn. If we consider the system of irons on the roller, they must leave some of the corn untouched by them, and then this is only rolling the corn in the common way, as it is only squeezed by the roller, and not bruised by the irons: so far there is no harm done. There must be corn, you will say, that is crushed and bruised, if not quite destroyed, by the violence of the irons: but supposing the corn lost, wherever the irons pitch, which is very far from being the case; yet the untouched corn will be so improved, by this shattering and loosening of the soil about their roots, and scraping of the mould by the thorn bush, and shaking and tearing the tender blade, that the owner will judge for himself, whether the Greek epigram ought to have a place among the paradoxes in agriculture. However, it can do no gentleman much harm to let the roller go down in one place, and up again in another, and give over; and this single trial is all that the author pleads for, and that the weather and state of the ground be such, as will safely admit of the experiment.

"The use of the roller, in making the fallows, and preparing the ground to a requisite degree of fineness, in the old, new, and what this Treatise calls the Semi-Virgilian Husbandry, is, by this time, pretty evident to the reader, and needs no more instances, where such perfection is desired. We now come to speak of its use on grass land, where the swarth is worn out by age, spoiled by moss, or a bad sort of grass; or defective in any shape, from some cause or other, and yet it is very dangerous to plough it up, and lay it down better, on account of its situation, or it is not convenient perhaps for other reasons, to disturb it with the plough: whatever the case is, the owner, undoubtedly, would be exceeding glad to have a better burden of grass on the ground, for the maintenance of his live stock, or for the pleasure of seeing his ground, about his house, put in a better appearance.

"Here, then, there must be some compost prepared; that is, a mixture of the dunghill, sods, ashes, lime, mould, soap-ashes, and such like ingredients, or as many of them as can be conveniently procured, laid up in a heap, in this manner: a stratum of mould about half a foot deep, then dung, then sods, then sop-ashes, then common ashes, then lime, then dung; and to cover all with mould, about half

half a foot deep. When theſe have laid ſome time, that the dung may communicate its juice to the ſtrata beneath, the heap may be thrown down with ſpades, ſo as, in the operation, theſe ingredients, being mixed together, the firſt ſtratum of half a foot, of the new heap, may be compoſed of all the ingredients; and ſo, in like manner, all the reſt of the ſtrata, till the new heap is compleated; and after theſe have laid ſome time, they will be very mellow, and fit for uſe the Michaelmas after the winter when the firſt heap was formed.

"We muſt now ſuppoſe the cloſe, whoſe ſwarth is to be improved, to have been laid down even, and not in ridges; and that between Michaelmas and Martinmas, the ſooner after the former the better, the ground is to be ſo moiſt, as to admit the irons of the ſpiky roller, but not the horſes feet; that is, the irons will penetrate three inches, or thereabouts, and the horſes feet make little or no impreſſion. Here, then, the roller muſt go up and down, till the ſwarth and ground are pretty well broken up: this being done, the ſeeds of clover, trefoil, and rye-graſs, or any other mixed with them, muſt be ſown, in the uſual way and quantity: then the compoſt muſt be ſpread over the ſeed, ſo as to cover them, and a common barley roller, with a thorn buſh faſtened to it, muſt follow, and the ground ſhut up, leſt cattle ſhould do harm, by treading the ground. A gentleman, making this experiment, will have great cauſe to be pleaſed with what he has done; and will, alſo, ſee the neceſſity of laying down his ground as even as poſſible for the future, that he may increaſe the burden of his graſs, whenever it falls ſhort of a proper quantity, or quality." *Randall's Semi-Virgilian Huſbandry, Append. page* 1.

We have added the figure given of this uſeful inſtrument by the above ingenious gentleman, on Plate XXIV. Fig. 5.

A correſpondent of the editors of the Muſeum Ruſticum, who calls himſelf a clay farmer, has made the following obſervations on the ſtructure and utility of the ſpiky roller.

"Give me leave, ſays he, to communicate to my brother farmers, a moſt uſeful implement in huſbandry, which has but of late been introduced amongſt us. It is ſo very efficacious, and its power ſo much ſuperior to all other inſtruments yet contrived for the reduction of ſtrong land, that, I think, there is not any poſſeſſor of ſuch ground (who has no objection to a fine ſeed furrow) that will be without this inſtrument. This laſt autumn it has been of the greateſt utility. For whilſt the neighbouring farmers were waiting for rain, ſo that they might with their own rolls and harrows bring their land to that degree of fineneſs they could wiſh to have their ſeed ſown in, thoſe who were poſſeſſed of the ſpiky roller, (for that is the name of the implement I am going to give ſome faint idea of, as it is impoſſible by letter to make any body more fully acquainted with it) had their fallows in ſuch a degree of fineneſs, as I never before ſaw that kind of land in; and had finiſhed the whole of their ſowing, before the others ever thought of taking their ploughs, &c. into the field.

"To begin then with the beſt deſcription I can give of the moſt complete I have yet ſeen. The roller is of oak, ſix feet three inches long, ſeventeen inches diameter, hooped with iron at each end; the circumference divided into eighteen equal parts, where rows of iron ſpikes are ſet (in the quincunx order) at ſix inches diſtance, one from the other, in the rows: ſo that there are thirteen ſpikes in one row, and twelve in every other throughout the circumference. The number of the ſpikes is two hundred and twenty-five. They are to project four inches and a half from the roller, and to be one inch by three quarters of an inch ſquare at that part of the ſpike next the roll, tapering off to three quarters of an inch by half an inch at the top part. The whole length of the ſpike, with what is driven into the wood, will be about nine inches long. And I would adviſe the falling ſide at the end of each ſpike to have a ſtroke or two with the hammer, that they may be a little more pointed to give them greater facility in penetrating the very hard clots they are deſigned to break. Every ſpike will weigh about one pound and a quarter, which will be of ſufficient ſtrength.

"The frame ſhould be made for horſes to draw a breaſt, or with a pole for oxen. For by the horſes, &c. drawing double, the roll is more eaſily turned; and, beſides, it is likely to prevent the end of the roller from going over the driver, if by chance he ſhould fall. That it may with greater eaſe and conveniency be conveyed from field to field, or to any diſtance, an axis is fixed upon the frame immediately above the roll with wheels; ſo that by turning the frame, the wheels take up the roll, and away you may drive. And, when you have brought it to the field, in order to make uſe of it, by turning the frame back again, you let down the roll, and then the wheels are carried by the roller.

"Since making of the above deſcription, I have talked with the wheelwright, who tells me, he could greatly improve the manner of fixing the wheels, by making them run within the frame; for as they now run without, it ſets the wheels at ſuch a diſtance, as makes it difficult to paſs through gates made only the common width. And likewiſe ſays, that great care muſt be taken in fixing that part of the frame which the gudgeons of the rolls run in: for by that means the roll will be let down with greater eaſe; which will not be the caſe, if regard is not paid to that particular. The roller, frame, wheels, &c. are, together, about eleven hundred weight.

"If your land, by once paſſing over it with the roller, is not ſo fine as you could wiſh to have it, let a large harrow be faſtened to the frame of the roller, which will pull up the remaining clots, and thereby give the roller a better chance for breaking of them the ſecond time going over. Four able horſes are equal to this work." *Muſeum Ruſticum, vol.* V. *page* 372.

Theſe obſervations induced the inventor, Mr. Randall, to ſend the following letter to the editors of the Muſeum Ruſticum.

"In your Muſeum for laſt December, ſays he, I obſerve my name mentioned concerning the ſpiky roller. Without making any comment on the clay farmer's dimenſions, for conſtructing this implement of huſbandry, I beg leave to tell him, and the reſt of your readers, that the length of mine, which was the firſt I ever ſaw or heard of, except what the late Mr. Ellis mentioned to ſo little purpoſe, was ſeven feet, the diameters of the ends eighteen inches, and the whole cylinder made of the heart of oak: and when the irons were burnt in, and the man ſeated on the box deſigned for that purpoſe, the weight of the whole was about a ton. But you will think it ſtrange, that the blunt end of the irons were oppoſed to the clods, and run more taper, till they came to the ſurface

face of the cylinder, into which the irons were burnt, and inſerted about three inches: which was their length above the ſurface of the roller, and which, I always found very ſufficient to cruſh the hardeſt clod that ever came in their way. Had I, indeed, attempted to go on the ground when the ſoil was not perfectly dry, this poſition of the irons would have carried the clods round with the roller: for it is not its province to ſqueeze but cruſh. Nor indeed can a man do more harm to his ground, than going upon it, when it is not quite dry, with a roller, conſtructed according to the clay farmer's form and ſize of the irons; or by that which I have recommended. I am ſenſible thoſe who conſtruct the roller, according to the clay farmer's directions, imagine, that by inverting the ſhape, there is leſs danger of carrying the moiſt clods round with the roller; but I muſt ſay again, there is no occaſion for this precaution: for, if the other form be at all neceſſary, it muſt be in the moiſt ſtate of the ground: which is the only reaſon we ſhould keep the roller off the ſoil. I had the irons fixed in four inches aſunder, in the firſt row, from end to end. The ſecond row began juſt between the firſt and ſecond irons of the firſt row. The third row was like the firſt, and the fourth like the ſecond. Then alternately for the whole ſurface of the cylinder, as near as could be, the irons were four inches aſunder in each individual row, and four inches from row to row, as nearly as the ſuperficies of the cylinder would permit. I do not know how to convey a juſter idea to your readers of the ſhape of the irons, than to call them ox-harrow-teeth, For when I ſent for the workman, I deſired him to make ſo many of this denomination, ſix inches in length; and burn the ſmall end three inches into the wood: he went from me, as perfectly underſtanding what I meant; brought his number of irons, and inſerted them a proper depth into the cylinder. If ſome of your ſouth-country readers ſhould be at a loſs to know what is meant by ox-harrow-teeth, they will be pleaſed to remember, that they are irons faſtened into two harrows, which are drawn by either four oxen and two horſes, or ſix oxen alone, in very ſtiff ſoils. Now, it will appear to you, that the roller itſelf, and one harrow, will require at leaſt four able horſes, according to the clay farmer's ſtating the caſe: but my roller, without harrows, always ſtood in need of three ſtout horſes, which the man from his box, always drove a-breaſt, for the greater convenience of turning on the land's ends. But were I to have two ox-harrows, (which would only extend the length of the roller) following the roller, for the purpoſe of tearing up clods, in order to be cruſhed, on going a ſecond time over the ſame, ſeven feet in length, I ſhould be obliged to have a much ſtronger team than four ſtout horſes; and, therefore, I muſt beg leave to obſerve, for this, an unanſwerable reaſon, that harrows are better omitted; as they always were, by my people, who ſet in with their ploughs, and turned up the ſoil from all requiſite depths, in order to have it cruſhed by the roller going twice in a place.

"If the clay farmer will not take it amiſs, I would tell him, that wheels to the roller only create expence and trouble. For I do not remember we ever had any diſadvantage from the weight of them in my four rollers, made for near a thouſand acres of land, of all denominations of ſoils, ſtiff and light: for, when the fellows had occaſion to convey the roller from one incloſure to another, and ſometimes over the hard high road, I never heard, or obſerved, there was the leaſt difficulty of doing it: as the irons were ſo ſtout, as not to receive any injury in the paſſage, otherwiſe than by friction; by which they would be indeed in time ſomewhat impaired. As to the width of the gates, I think there was never any ſtoppage; ſince the men, when they found the paſſage rather too ſtrait, could, by turning the horſes heads, eaſily incline the roller on one ſide, and by that means wriggle it in, where it was too long for entrance. Let who will be the father, or grandfather of this valuable inſtrument of huſbandry, I had reaſon to be extremely well pleaſed with my lucky hit, in conſtructing it from Mr. Ellis's barely mentioning a ſpiky roller: though from his uſual giddineſs, he gave his readers no more than the name. As it is of conſequence to the world, to keep the expence of this inſtrument as low as poſſible, I ſhall be very ſorry to hear any more of wheels, for it may deter farmers from uſing it; and without their hearty concurrence, all will be only playing at farming. Gentlemen may pleaſe themſelves in every variation of the implements and modes of culture: but without the aſſiſtance of thoſe, who bleſs the nation with their endleſs toil, a thouſand years hence will be as to morrow.

"Beſides the purpoſes already mentioned, this roller muſt undoubtedly be of uſe in laying, originally, down lawns, or large pieces of graſs required to be level. Mr. Randal only mentions the reſtoring ſuch when depraved: but certainly this inſtrument muſt be extremely effectual in the caſe of all ſtiff lands, for the producing a good face in the firſt forming of fine pieces of graſs. The manner of doing this, in ſuch caſes, is too obvious to perſons qualified for executing ſuch work, to require any explanation: as the inſtrument may be uſed concurrently with any of the common methods of manuring and ſowing graſs ſeeds, as well as with Mr. Randal's compoſt, &c. they being no ways particularly neceſſary to the effects of the roller, though it may greatly aid them.

"This roller may likewiſe be very uſeful in preparing clay for the making canals or pieces of water. For where, as ſometimes happens, the clay grows dry, and will not admit of being duly tempered for uſe without great pains in breaking it, a very large quantity may very ſoon be reduced to the requiſite fineneſs, by ſpreading it on hard ground in a due thickneſs, and paſſing this roller a few times over it. In very great works, much trouble and labour may be ſometimes ſaved, by this means, where ſuch a roller is at hand; and the clay prepared in a manner that will anſwer the purpoſe much more effectually.

"It is certainly an inſtrument which, no farm, where the land is ſtiff, or in the leaſt liable to clot, ſhould want. For beſides the conſtant advantage of ſaving labour, and bringing land to a better condition for any kind of ſowing than the plough and harrow with any aſſiſtance of the work of hands can make it, in favourable ſeaſons and under ſuch circumſtances as Mr. Randal has mentioned in the above quotation, the loſs of the whole crop by an otherwiſe unavoidable delay beyond the ſeed time, may be with certainty prevented."

We ſhall conclude this article with the following ingenious account of the uſes of this inſtrument, which we have been favoured with from Mr. John Berington, of Winſley, near Hereford.

"As I live, ſays he, in a clay country, and had been often put to a great deal of difficulty in a dry unkind ſeaſon, in reducing the land to a proper tilth, I reſolved to make trial of Mr. Randal's ſpiky roller; but apprehend-

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ing great ſtreſs muſt lie upon the horſe and ſrame, in turning ſuch, as well as tearning up the ground, it occurred to me, that I had ſeen recommended a double roller, that is, one divided in two parts. It is very probable that you have it already in deſign; if not, the following directions, I imagine, may ſuffice.

"Let the ends of each part be bound with narrow but ſtrong bands of iron, and let the ſpikes at the ends be placed cloſe to them; let each part have a ſeparate frame, but let the cheeks in which the inward gudgeons turn, be made of iron plates, about two inches wide above, and four where the gudgeons enter; the thickneſs, a common flat bar of iron; and theſe fixed in any firm manner, to two cheeks of wood reaching down juſt to the bands, and of ſuch a thickneſs at bottom as not to interrupt the ſpikes. Let the inward gudgeons be made with quite flat heads, to prevent their dipping out in working; and this brings the two ends of the roller near together, which is of ſome little conſequence, as the fewer clots will be miſſed in working.

"Let the frames be joined together by four eyes, like thoſe of a ſmall gate, two at one end about five or ſix inches apart; the two at the end of the other, to take place juſt within them; an iron pin through all four, and keyed. Let the trills be placed juſt on the middle of each frame, and a bar of wood juſt behind the horſe to ſtrengthen them; the bar ſawed through in the middle, and joined by a ſtrong flat hinge: one ſide made to haſp upon a ſtaple, kept down with a wooden clet. This gives the whole proper play in working; and I may venture to affirm, it will be found, next to the plough, the moſt uſeful inſtrument in tillage, not only in reducing a ſtiff ſoil, but with a buſh at its tail, as Mr. Randal expreſſes it, will cover the ſeed when ſown much more effectually, and in a better manner, than a harrow, as it turns up the earth light and fine behind it; and though ſeemingly unweildy, will turn with eaſe, and may be worked with one, two, or three horſes at moſt, upon any land that is of a proper dryneſs to work upon, of which I cannot well forbear giving you an inſtance: the carter that was to drive it exclaimed, when he firſt ſaw it, that it would kill all his horſes: ſome time after, as he was uſing it upon a piece of fallow, a fellow-ſervant wanted a horſe for ſome uſe, and was going to catch one; the carter called to him, and told him, he might take one of his, having three, as he could do very well with two. Now I believe you will allow, that if it could ſo eaſily overcome the obſtinacy of a clown, there are very few clods that will be too hard for it.

"The ſpikes are about four inches without, and three within the wood; the thickneſs of the roller, and number of ſpikes, I think, may be determined, in ſome meaſure, by the nature of the ſoil it is to work upon."

The ſpiky roller is, undoubtedly, one of the moſt uſeful inſtruments in huſbandry of modern invention, and will be found applicable to ſeveral other purpoſes, beſides thoſe above-mentioned: one in particular is, to aſſiſt in reducing the half burnt turf of burn baked land, which requires much labour, as commonly done by hand; but by going over the land ſeveral times with the ſpiky roller, and harrowing it with heavy harrows alternately, to pull up the turfs, or ploughing them up, they may be reduced fine, in a much ſhorter time, and at a much leſs expence, than by beating, to break them by hand.

"In Devonſhire and Cornwall, ſays Mr. Harte, p 84 of his Eſſays on Huſbandry, they Denſhire their old paſtures, which when very coarſe and graſſy, and choaked with weeds, they pare off the ſurface about three inches thick, with the old Engliſh beating axe, (which is nearly the ſame as the Marquis de Tourbilly's cob, or paring axe) into turfs about two feet three inches long, and ten or eleven inches broad; and the workman or parer ſets up theſe turfs very dexterouſly, into a ſort of ſpiral pyramid or cone, with his axe, ſomething in the form of an high crowned hat, but more obtuſe, with the graſſy ſide outermoſt; in which poſition they dry conveniently and ſpeedily. They commonly make about two hundred ſuch ſmall heaps upon an acre; but in burning theſe ſmall heaps, a great part of the outermoſt turfs will remain uncalcined: and therefore Mr. Harte propoſes to make but forty heaps upon an acre, with half a furze faggot placed near the bottom of each, and an air-hole fronting the wind. That he has known above five hundred buſhels of aſhes procured from a ſingle acre, and the common expence there, of paring, burning, and ſpreading the aſhes, is about twenty-ſeven ſhillings per acre.

But where a paring plough can be uſed, much of the expence of paring may be ſaved. And here we ſee, that a great part of the outermoſt turfs remain uncalcined, which muſt be broken by hand, but much more ſpeedily with the aſſiſtance of the ſpiky roller.

The Marquis of Tourbilly directs the turf, of land over-run with heath, ferne, &c. to be pared four inches deep, and the turfs to be cut eighteen inches long and nine broad, to be laid flat with the bare or earthy ſide downwards, the end of each turf to reſt upon the preceding one. Or, if to be dried ſooner, or in wet weather, to ſet them up on edge in little round heaps, or elſe in pairs, leaning one againſt another, with the heathy ſide outwards; and when dry to be ſet up in large heaps, rounding towards the top, with the heathy or graſſy ſides all laid downwards, and a ſmall hearth or chimney near the bottom of each heap, facing the wind: the heaps to be ten feet diameter, and ten feet high; to be immediately ſet fire to, as ſoon as made, with a little ſtraw, &c. at the end of a fork; but he directs no furze to be laid on the hearth, nor is it neceſſary if the turfs are dry when ſet up; for then they will readily take fire by carrying ſome hot coals from one heap to another, in ſhovels. The Marquis computes the expences, as it coſt him, at about thirty livres per arpent, amounting to about twenty ſhillings per Engliſh acre.

"I have, ſays the Marquis, often remarked, that in thoſe places where the upper turfs of the clumps, which had burned ſlow, remained almoſt whole, and were but merely calcined, inſomuch that it was neceſſary to break them before the ground could be ſown, the corn always flouriſhed moſt, and much better than in thoſe places where the furnaces, after burning every thing, were totally converted into heaps of aſhes alone. In general, thoſe heaps where the aſhes after burning are white, are the leaſt valuable, as well as leaſt in bulk. This denotes vitrification more than calcination. In proportion as the aſhes are yellowiſh, brown, or black, which is the degree of their perfection, they are the beſt, and the heaps generally the largeſt. In proportion to theſe colours, the calcination exceeds the vitrification." For this reaſon, thoſe who

who burn-beat their land, chooſe to perform it with a ſmothering fire, as that is a means of preventing the vitrification, and makes the greater improvement; but this leaves a greater proportion of turfs imperfectly burnt, and renders the ſpiky roller of more uſe to break and pulverize thoſe imperfect burnt turfs, with leſs manual labour, eſpecially, as the Marquis obſerves, the turfs cannot be all broken ſufficiently by hand work the firſt year, but ſome will remain unbroken to the ſecond year after burning, notwithſtanding his giving the land five ploughings, and as many harrowings, before it was ſown with wheat or rye; and yet the firſt crop was but indifferent.

"As to the little freeholders, continues this gentleman, and farmers, who have but a few acres, and after having grubbed, cleared and burned them, in the manner before mentioned, labour them by the ſtrength of their arms, with the pick-axe, ſhovel, ſpade, or other inſtrument, and wiſh to ſow in one of the above-mentioned methods; they muſt take care to mix the aſhes well with the ſoil, and to carry off all the ſtones and roots. Theſe are they who will, in proportion, reap the moſt corn the firſt year, as digging ſtirs the ground much better than ploughing. Were it poſſible to cultivate all one's ground thus, with a ſpade, it would produce a great deal more"

Hence appears the advantage of giving ſuch land good and deep culture the firſt year, and immediately after the aſhes are ſpread upon the land; which may be done by the aſſiſtance of the ſpiky roller, which will break and reduce the imperfect burnt turfs before the land is ploughed up, and will afterwards quickly reduce alſo the land after it is ploughed, and dry, at a much leſs expence than can be done by the plough and harrows, as appears by the above examples, of the powerful effects of it, upon ſtrong and cloddy land.

Inſtead of ſowing this land, when thus reduced, with corn, for a firſt crop, it will be better to ſow turnips, if the land is ready in proper time; and if they are drilled upon four feet ridges, and horſe hoed, the occupier may obtain, not only a great crop of turnips, which land thus prepared is found to produce, but the land will be admirably prepared (by repeated deep horſe hoeings, and thoroughly mixing the aſhes with the land) for any ſucceeding crop; or to lay it down in fine order with ſainfoin or graſs ſeeds; in doing which (or for any other crop) great care ſhould be taken, to procure perfectly clean ſeed, and to lay no farm yard, or ſtable dung, upon the land, or any other kinds of manure, which are ſuſpected to have any ſeeds of weeds in them. For the fire having wholly deſtroyed the graſs and all the ſeeds and roots of weeds that were in the land, (together with the worms and noxious inſects) it may now be kept perfectly clean, and continued ſo, with proper care, for many years: "for a conſiderable time, ſays the Marquis, not ſo much as a blade of graſs grows in the corn: there is ſcarcely any as yet appears, in the lands that I pared and burned at firſt;" which was more than twenty years before he wrote this.

SPINDLING, running to ſeed.

SPLENT, a hard excreſcence growing on the ſhank bone of a horſe.

Some horſes are more ſubject to ſplents than others: but young horſes are moſt liable to theſe infirmities, which often wear off, and diſappear of themſelves. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents.

A ſplent that ariſes in the middle of the ſhank bone is no ways dangerous; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs, by rubbing againſt it; the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

As to the cure of ſplents, the beſt way is not to meddle with them, unleſs they are ſo large as to diſfigure a horſe, or ſo ſituated as to endanger his going lame.

Splents in their infancy, and on their firſt appearance, ſhould be well bathed with vinegar, or old verjuice; which, by ſtrengthening the fibres, often puts a ſtop to their growth; for the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is what often gives riſe to ſuch excreſcences.

Various are the remedies preſcribed for this diſorder; the uſual way is to rub the ſplent with a round ſtick, or the handle of a hammer, till it is almoſt raw, and then touch it with oil of origanum. Others lay on a pitch plaiſter, with a little ſublimate, or arſenic, to deſtroy the ſubſtance: ſome uſe oil of vitriol; ſome tincture of cantharides; all which methods have at times ſucceeded; only they are apt to leave a ſcar with the loſs of hair. Thoſe applications that are of a more cauſtic nature often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a rottenneſs, which keeps running ſeveral months before the ulcer can be healed, and then leaves an ugly ſcar.

Mild bliſters often repeated, as recommended in the article ſpavin, ſhould be firſt tried as the moſt eligible method, and will generally ſucceed, even beyond expectation: but if they fail, and the ſplent be near the knee or joints, you muſt fire and bliſter in the ſame manner as for the bone ſpavin.

Splents on the back part of the ſhank-bone, are difficult to cure, by reaſon of the back ſinews covering them; the beſt way is to bore the ſplent in ſeveral places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very cloſe together.

To SPRAIN SEEDS, ſignifies, to throw them with a ſingle motion of the hand at a certain diſtance from one another.

SPRIG, a ſmall branch, a ſpray.

SPRING, the ſeaſon in which plants vegetate.

Spring alſo ſignifies a fountain, or iſſue of water from the earth. *See the articles* DRAINING *and* WATER.

SPRING-WHEAT, a ſpecies of wheat ſown in the ſpring. *See the article* WHEAT.

The following experiment and obſervations on the comparative ripening of ſpring and common wheat made by the ingenious Mr John Wynn Baker, and reported by that gentleman to the Dublin Society, muſt not be omitted here.

"Some little time after receiving the inſtructions I was honoured with from the ſociety, I was deſired by the committee, then ſitting, to ſettle the premiums for the ſucceeding year, to make a comparative experiment between ſpring and common wheat.

"The purpoſe of this experiment was to diſcover, whether common wheat would not ripen when ſown late in the ſpring, as well as ſpring wheat.

"Accordingly, on the twenty-eighth day of March, I ſowed two perches of each ſort of wheat in my garden, in drills three feet aſunder, at the rate of five ſtone to an acre. I had but two pounds of ſpring wheat, otherwiſe I ſhould have extended the experiment.

"The common wheat came up well, but the ſpring wheat came up very thin in the drills, which, for ſome time, I apprehended, was owing to ſome fault in the ſeed; but the caſe was otherwiſe, as appeared afterwards from a ſecond ſowing in another place: add to this, that in a few days I diſcovered mice had eaten great part of the ſeed; however, ſome little of it eſcaped, and planted greatly, as did the common wheat.

"As a ſubſtitute for the horſe-hoe, which could not be introduced in theſe ſmall experiments, I uſed the ſpade, and the plants grew to admiration.

"The fatality which attends all ſmall experiments in the corn tribe followed theſe: for I was obliged to cut the ſpring wheat before it was ripe, the birds, in defiance of all protection, having devoured moſt of it; however, it would have ripened completely, and, as a proof of this aſſertion, I have a few ears, which I ſelected from the reſt, which are very fine.

"It may be proper to obſerve, that the ſpring wheat was more expoſed to the ravages of birds than the other, as the common wheat I ſowed was bearded, which is always a great, though not a perfect, protection to it from birds.

"The common wheat met with a diſtemper which was quite as fatal to it, as the mice and birds were to the other: this was the ruſt, or mildew. Before this diſeaſe came upon it, it was as fine corn as ever I ſaw, but it never ripened; although in appearance the ears were very fine.

"This diſeaſe attacking this corn and ſparing the other, I am inclined to attribute to this circumſtance, viz. that this was very thick and ſtrong; whereas the other was very thin, from the accident before-mentioned: perhaps had it been as thick, it might have ſhared the ſame fate. So that I think theſe experiments are not by any means concluſive, as to the ripening of either of theſe ſpecies of wheat, when ſown late in the ſpring.

"I ſowed another plot of ground, as was before mentioned, on the fourth of May with ſpring wheat, which came up well, grew very ſtrong, and formed very fine ears in appearance, but never ripened.

"On the twenty-ninth of April, I ſowed an acre of very good ground with common wheat, which I ſteeped before-hand in putrid water; it came up in eight days, but made no figure till June; it formed ſmall ears, but produced no grain at all.

"So far we have two concluſive experiments that ſpring wheat will not ripen when ſown in the beginning of May; and that common wheat will not ripen when ſown the latter end of April.

"Notwithſtanding that our queſtion is not anſwered by the two firſt experiments, yet the diſeaſe attending the common wheat has furniſhed ſome obſervations with reſpect to the mildew, or ruſt, upon corn and other plants, which tend principally to confirm thoſe made by the ingenious Mr. Tillet, director of the mint at Troys, and ſeem to contradict moſt of our Engliſh writers on this diſeaſe; many of whom ſeem to have implicitly followed others, who, I am afraid, have undertaken to account for, and furniſh remedies againſt, a diſeaſe, which perhaps they had never ſeen.

"Various are the opinions, and many of them contradictory in themſelves; but, upon the whole, candour obliges me to own myſelf as much at a loſs to determine with certainty, the cauſe of this diſeaſe, as, I find, the many writers are, who have thought themſelves perfect maſters of it. Even by reading ſix pompous pages, which I have gone over many times, I ſhould ſcarcely know the diſeaſe, ſo faint is the deſcription; but it will ever be known by the greateſt ſtrangers to country affairs under the French name, which indeed is as truly deſcriptive as it is laconic, by them it is called *rouille*, or ruſt. By the Romans it ſeems to have been called *rubigo*.

"I ſhall omit to give my obſervations upon this diſeaſe at preſent, as it would oblige me to quote many tedious paſſages from the books; and where there is a contrariety of opinions, although without evidence: yet a little man, with a few facts only to ſupport a new theory, would ſtand a chance of making but a poor figure.

"At preſent I join in opinion with Mr. Tillet, and Mr. Reneaume; who ſeem to think that the extravaſated juices of the plants, operated upon, and condenſed, by the acrimony of the air, I ſhould rather ſay incruſted, are the occaſion of it. To this I ſhall only add, that I am at preſent of opinion, that the lacerated parts of the plant giving paſſage to, or rather changing the courſe of, the juices before-mentioned (which are the nutriment and life of the plants) to the diminution, and loſs of the vegetable food to the nobler parts, is the true cauſe of the plants failing in their produce: but, I repeat it, I attempt not here to account how, and from what cauſe, thoſe lacerations, which I believe to be the baſis of the diſeaſe, happen.

"The comparative experiment between ſpring and common wheat, I think, ſhould be repeated, as the diſcovery thereby ſought for tends to a public benefit; but it ſhould be in a larger way, and in an open expoſure.

"A circumſtance has recurred to my memory, which had eſcaped my attention from the time it happened, till ſince I entered upon this ſubject.

"Laſt ſpring, a poor neighbour of mine told me he had loſt the ſeaſon for ſowing his wheat, for want of money to buy ſeed, but that, if he could get a barrel of Poland wheat, (as he called it) which was the white cone, he would then ſow his ground: accordingly he obtained the ſeed, and did ſow it; but I underſtand, upon enquiry, that it produced not a good crop. He ſowed it ſome time about the beginning of February.

"And yet I am informed there is a gentleman in Scotland, who makes it his conſtant practice to ſow his wheat in the ſpring by choice: and that he intends to publiſh a recommendation of that practice.

"The lateſt I ever ſowed any with ſucceſs was the thirtieth of December; but that was only a ſmall experiment.

SPROUT-HILL. *See the article* ANT-HILL.

SPRIT, a ſhoot or ſprout.

SPUR, a diſtemper which frequently attacks rye, and ſometimes does damage likewiſe to wheat. The following remarks will give an idea of it.

"1. The grains which have the ſpur are thicker and longer

longer than the ſound ones, and generally project beyond their huſks, appearing ſometimes ſtrait and ſometimes more or leſs crooked.

"2. Their outſides are brown or black; their ſurface is rough; and one may frequently perceive in them three furrows, which run from end to end. Their outward end is always thicker than that which ſticks to the chaff, and that moſt ſwollen end is ſometimes ſplit into two or three parts. It is not unuſual to find on their ſurface cavities which ſeem to have been made by inſects.

"3. When a ſpurred grain is broken, one perceives in the middle or centre of it a pretty white flour, covered with another flour, which is reddiſh or brown. Though this vitiated flour has ſome conſiſtency, it may nevertheleſs be crumbled between one's fingers. M. Aimen has indeed ſometimes found this powder almoſt as black as that of ſmutty wheat.

"4. Theſe grains, when put into water, ſwim at firſt, and afterwards ſink to the bottom. If chewed, they leave a bitter reliſh on the tongue.

"5. The chaff appears ſound, though what is outmoſt is ſomewhat browner than when the ears are ſound.

"6. All the grains of the ſame ear are not ever attacked with the ſpur.

"7 The grains which have this diſtemper ſtick leſs to the ſtalks than ſound grains do.

"8. M. Aimen imputes this diſtemper to the grains not being impregnated; and aſſures us that he has not ever found a germ in grains which had the ſpur. The ſame obſerver has collected, in a memoir which he has ſent me, ſeveral reflections and microſcopical obſervations; but I paſs over in ſilence ſuch reſearches as are more curious than uſeful.

"9. I ſhall not ſtop to refute the opinion of thoſe who have pretended that fogs, dews, rain, the moiſture of the earth, may give this diſtemper to rye. But I cannot help ſaying, that M. Tillet thinks, as does alſo M. Aimen, that other plants, beſides rye, are ſubject to the ſpur. M. Tillet has ſeen, and M. Delu has ſhewn me, grains of wheat which had the ſpur. The ſpur ought therefore not to be confounded with the uſtilago or burnt grain: they are two different diſtempers: and what ſeems ſtill more to eſtabliſh this difference, is, that M. Tillet's experiments prove that the powder of the ſpurred grains is not contagious like that of the carious or burnt.

"M. Tillet is ſtrongly inclined to think that the ſpur is occaſioned by the ſting or bite of an inſect, which turns the rye into a kind of gall; and he ſuſpects a ſmall caterpillar of being the cauſe of this miſchief. But neither he nor I dare to ſpeak affirmatively on this point.

"Dodard, Longius, Fagon, Delahire, Noel, and lately, M. Salerne, gave particular accounts of the diſeaſes with which numbers of people have been ſeized in ſome years, owing to their having lived upon bread in which there was much rye affected with this diſtemper.

"As moſt of the diſtempered grains are much bigger than the ſound ones, it is eaſy to ſeparate the greateſt part of them by ſifting. It is what the peaſants of Sologne do, when corn is not dear; but in times of great ſcarcity or dearth, they are loth to loſe ſo much grain; and then it is that they are attacked with the gangrene, which mortifies the extreme parts of the body, ſo that they fall off, almoſt without cauſing pain and without any hemorrhage. The Hotel-Dieu at Paris had had many of theſe miſerable objects, who had nothing more remaining than the bare trunk of the body, and yet lived in that condition ſeveral days.

"As it is not every year that the ſpur in rye produces theſe dreadful accidents, Langius is of opinion that there may be two kinds of this diſtemper; one which is not hurtful, and the other which occaſions the gangrene we have been ſpeaking of. It is however probable that there is but one kind of ſpur, and that it does not hurt, firſt, when ſufficient care is taken in ſifting the grain; and, ſecondly, when only a ſmall part of the corn is diſtempered. It is alſo ſaid, that the ſpur loſes its bad quality after the grain has been kept a certain time: in which caſe, the reaſon why ſome peaſants are attacked with the gangrene in years of dearth may be, that they conſume their crop as ſoon as the harveſt is over." *Duhamel's Culture des Terres.*

SPURRE-WAY, a horſe-way through incloſed lands, and free to any one to ride in by right of cuſtom.

SPURREY, the name of a weed common in many parts of England. It ſeldom riſes above ſix inches in height, flowers in the beginning of July, ripens its ſeeds in Auguſt, and is an annual plant.

The beſt method of exterminating this weed is by ſummer fallows, and cutting it down before it can ſcatter its ſeeds, which are very ſmall.

They cultivate two ſpecies of this plant in Holland and Flanders for the winter food of cattle, when there is a ſcarcity of graſs. It is ſaid to enrich the milk of cows ſo as to make it afford excellent butter; and the mutton fed on it is preferable to that fed on turnips. Hens alſo eat this plant greedily, and it is commonly thought to make them lay an extraordinary number of eggs.

Though this plant cannot, from the lowneſs of its growth, afford a very great quantity of fodder, yet as it will grow on the pooreſt land, where no other graſs will thrive ſo well, it may be cultivated to conſiderable advantage in many places; and by feeding it off the ground, the dung of the cattle will improve the land.

The farmers in the low countries commonly ſow it twice a year; the firſt time in April or May, to be in flower in June or July; and the ſecond time after their rye-harveſt, to ſerve their cattle in November and December. The uſual allowance with them is about twelve pound of ſeed to an acre.

STABBING *of cattle.* *See the article* HOVEN.

STABLE, a place or houſe for horſes, &c. furniſhed with ſtalls and proper apartments to contain their food, &c.

Nothing conduces more to the health of a horſe than the having a good and wholeſome ſtable. The ſituation of a ſtable ſhould always be in a good air, and on a firm, dry, and hard ground, that in winter the horſe may go out and come in clean. It ſhould always be built ſomewhat on an aſcent, that the urine and other foulneſſes may be eaſily conveyed away by means of trenches or ſinks for that purpoſe. As there is no animal that delights more in cleanlineſs than the horſe, or that more abominates bad ſmells, care ſhould be taken that there be no hen-rooſt, hog-ſtie, or neceſſary-houſe, near the place where the ſtable is to be built; for the ſwallowing of feathers, which is very apt to happen, when hen-roofts are near, often proves mortal to horſes; and the ſteams of a bog houſe, or hog's dung will breed many diſtempers. The walls of a ſtable, which ought to be of brick rather than ſtone, ſhould be made of a moderate thickneſs, two bricks, or a

brick and a half at leaſt, for the ſake of warmth in the winter, and to keep out the heat in the ſummer. The windows ſhould be made on the eaſt or north ſide of the building, that the north wind may be let in to cool the ſtables in the ſummer, and the riſing ſun all the year round, eſpecially in winter. The windows ſhould either be faſhed, or have large caſements, for the ſake of letting in air enough; and there ſhould always be cloſe wooden ſhutters, that the light may be ſhut out at pleaſure, by which means the horſe may be made to ſleep in the day as well as in the night, when it is judged proper he ſhould do ſo. Many pave the whole ſtable with ſtone, but that part which the horſe is to lie on ſhould be boarded with oak planks, which ſhould be laid as even as poſſible, and croſs-wiſe rather than length-wiſe; and there ſhould be ſeveral holes bored through them to receive the urine, and carry it off underneath the floor into one common receptacle; the ground behind ſhould be raiſed to a level with the planks, and it ſhould be paved with ſmall pebbles. There are two rings to be placed on each ſide of the ſtall, for the horſe's halter to run through, and a logger is to be fixed to the end of this ſufficient to poiſe it perpendicularly, but not ſo heavy as to tire the horſe, or to hinder him from eating; the beſt place for him to eat his corn in is a drawer or locker, made in the wainſcot partition, which need not be large, ſo that it may be taken out at pleaſure to clean it, by which means the common dirtineſs of a fixed manger may be avoided. Many people are againſt having a rack in their ſtables; they give the horſe his hay ſprinkled upon his litter, and if they think he treads it too much, they only nail up three or four boards, by way of a trough, to give it to him in: the reaſon of this is, that the continual lifting up of the head to feed out of the rack, is an unnatural poſture for a horſe, who was intended to take his food up from the ground, and makes him, as they expreſs it, withy-cragged. When there is ſtable-room enough, partitions are to be made for ſeveral horſes to ſtand in: theſe ſhould always allow room ſufficient for the horſe to turn about and lie down conveniently, and they ſhould be boarded up ſo high towards the head, that the horſes placed in ſeparate ſtalls may not be able to ſmell at one another, nor moleſt each other any way. One of theſe ſtalls ought to be covered in, and made convenient for the groom to lie in, in caſe of a match, or the ſickneſs of a horſe. Behind the horſes there ſhould be a row of pegs, to hang up ſaddles, bridles, and other utenſils; and ſome ſhelves for the bruſhes, pots of ointment, &c. The other requiſites for a ſtable are a dung-yard, a pump, and a conduit.

STACK, a large quantity of corn, hay, ſtraw, &c. regularly piled up, and generally thatched to defend the contents from the weather.

It is very common in order to preſerve corn in the ſtraw to make it up into ſtacks, by which means they often meet with very great loſſes by the dampneſs of the ground, which commonly rots and ſpoils it, ſometimes near a yard thick; and by rats and mice, and other vermin that breed in the ſtack, which eat and devour a great part thereof. To prevent both theſe inconveniencies, where timber is plentiful, they ſet four, or ſix, or more poſts into the ground, according to the bigneſs that they deſign the ſtack, granary, or barn that the corn is to be laid in: on theſe poſts they lay what is the ground plats of other buildings, upon which they make a floor, or lay pieces acroſs to ſupport the ſtack: and if they make a barn or granary of it, they erect ſides and a roof upon it; but if only a ſtack, they cover it with thatch, and the poſts that ſupport it is, by ſome perſons, covered round with tin near the top, for about a foot or ſo in breadth, in order to prevent the mice and rats getting up. But as tin is apt to ruſt, and ſo to loſe its ſmoothneſs, it will not anſwer the deſign long; therefore the better to prevent their getting up, is to cover them with Dutch tile, which will always keep ſmooth. But in Hampſhire and other counties, where they have plenty of ſtone, they make their ſupporters of two ſtones, which is the beſt way.

The lower ſtone is about three feet high, two feet wide at the bottom, and one at the top; over this they lay another ſtone, of about a yard ſquare: ſome make it of a round form, which is the beſt. This prevents not only the mice and rats from climbing up, but alſo the dampneſs of the ground: and this way you may keep corn as long as you will, without much inconvenience or loſs, except what it loſeth in the firſt year's ſhrinking, and loſs of weight, which is very inconſiderable. Only you muſt obſerve, that what corn you ſtack muſt be bound up in ſheaves, that ſo the ears of the corn may be turned inward, and the ſtraw ends out, which will ſave the corn from pidgeons, crows, and other fowls, and likewiſe from the rain that beats on the ſides. If your ſtack be of wheat, you may lay oats or other coarſe grain on the top of it, under the thatch, the greateſt danger of wet being from the top, if any of the thatch ſhould blow off. And if you ſuſpect any rats or mice have got into the ſtack, greaſe a ſtick and thruſt it into it; and if there be any, they will gnaw the ſtick. The chief inconvenience that attends this way of keeping of corn, is its bulkineſs, and the farmers wanting of his ſtraw to make dung with, and the chaff to give to his cattle, &c. *Mortimer's Huſbandry vol.* II. *pag.* 141.

STACK *of Wood*, a pile of wood three feet long, as many broad, and twelve feet high.

STADLE, the bottom of a corn mow, or hay-ſtack. It alſo ſignifies a tree ſuffered to grow for coarſe or common uſes, as poſts or rails.

STAG-EVIL. *See the article* STAGGERS.

STAGGERS, a diſeaſe incident to horſes: a kind of apoplexy.

Farriers generally include all diſtempers of the head, under two general denominations, viz. ſtaggers, and convulſions, wherein they always ſuppoſe the head primarily affected. But in treating theſe diſorders, we ſhall diſtinguiſh between thoſe that are peculiar to the head, as having their ſource originally thence, and thoſe that are only concomitants of ſome other diſeaſe, where the head is affected ſecondarily by conſent of nerves, the ſource of this diſorder being in the ſtomach, bowels, &c. By this method we ſhall avoid many blunders which would otherwiſe ariſe in practice, for want of knowing the true ſeat of the diſorder.

In an apoplexy a horſe drops down ſuddenly, without other ſenſe or motion than a working at his flanks.

The previous ſymptoms are drowſineſs, watry eyes, ſomewhat full and inflamed; a diſpoſition to reel, feebleneſs, a bad appetite; the head almoſt conſtantly hanging, or reſting on the manger; ſometimes with little or no fever, and ſcarce any alteration in the dung or urine: the horſe is ſometimes diſpoſed to rear up, and apt to fall back when handled about the head, which is often the caſe with young horſes, to which it does not prove ſud-

denly

denly mortal, but with proper help they may ſometimes recover. If the apoplexy proceeds from wounds, or blows on the head, or matter on the brain, beſides the above ſymptoms, the horſe will be frantick by fits, eſpecially after his feeds, ſo as to ſtart and fly at every thing. Theſe caſes ſeldom admit of a perfect recovery; and when horſes fall down ſuddenly, and work violently at their flanks, without any ability to riſe after a plentiful bleeding, they ſeldom recover.

All that can be done is to empty the veſſels as ſpeedily as poſſible, by ſtriking the veins in ſeveral parts at once, bleeding to four or five quarts, and to raiſe up the horſe's head and ſhoulders, ſupporting them with plenty of ſtraw. If he ſurvives the fit, cut ſeveral rowels; give him night and morning, glyſters prepared with a ſtrong decoction of ſenna and ſalt, or the purging glyſter; blow once a day up his noſtrils a dram of powder of aſarabacca, which will promote a great diſcharge, afterwards two or three aloetic purges ſhould be given; and to ſecure him from a relapſe, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a month; or which is preferable, the ſame quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fullneſs of blood, high feeding, and want of ſufficient exerciſe, or a ſizy blood (which is often the caſe with young horſes, who though they reel, ſtagger, and ſometimes ſuddenly fall down, yet are eaſily cured by the above method) an opening diet with ſcalded bran and barley will be neceſſary for ſome time; and the bleeding may be repeated in ſmall quantities.

As to the other diſorders of the head, ſuch as lethargy, or ſleeping evil, epilepſy, or falling ſickneſs, vertigo, frenzy, and madneſs, convulſions, and paralytical diſorders, as they are moſt of them to be treated as the apoplexy and epilepſy, by bleedings and evacuations, with the alteratives there directed, we ſhall wave treating on them ſeparately, but mention ſome particular rules to diſtinguiſh them, according to the plan we laid down, and then offer ſome general remedies for the ſeveral purpoſes.

Thus in order to diſtinguiſh epileptic diſorders and convulſions (which are often occaſioned by worms, bots, and ulceration of the ſtomach, bowels and midriff) from thoſe which ariſe from original cauſes in the head only, we ſhall deſcribe the ſymptoms which diſtinguiſh them from each other; by which means we ſhall be able to avoid any miſtake in the application of the remedy: and as epileptic diſorders have by ignorant farriers been miſtaken for the gripes, we ſhall alſo diſtinguiſh theſe diſorders by the ſymptoms.

In an epilepſy, or falling ſickneſs, the horſe reels and ſtaggers, his eyes are fixed in his head, he has no ſenſe of what he is doing, he ſtales and dungs inſenſibly, he runs round and falls ſuddenly; ſometimes he is immoveable, with his legs ſtretched out, as if he was dead, except only a quick motion of his heart and lungs, which cauſes a violent working of his flanks: ſometimes he has involuntary motions and ſhaking of his limbs, ſo ſtrong, that he has not only beat and ſpurned his litter, but the pavement with it; and with theſe alternate ſymptoms a horſe has continued more than three hours, and then has as ſurprizingly recovered; at the going off of the fit, he generally foams at the mouth, the foam being white and dry, like what comes from a healthful horſe when he champs on the bit.

But in all kinds of gripes, whether they proceed from diſorders in the guts, or retention of urine, a horſe is often up and down, rolls and tumbles about, and when he goes to lie down generally makes ſeveral motions with great ſeeming carefulneſs, which ſhews he has a ſenſe of his pain, and if he lays ſtretched out for any time, it is generally but for a ſhort ſpace.

Epilepſies and convulſions may ariſe from blows on the head, too violent exerciſe, and hard ſtraining; and from a fullneſs of blood, or impoveriſhed blood, and ſurfeits; which are ſome of the cauſes that denote the original diſorder.

But the head may alſo be affected by ſympathy of nerves; for exceſſive pain in any part of the body will excite convulſions, eſpecially if the nerves and tendinous parts are affected, as by wounds, punctures, and bruiſes externally; and by ulcers, gatherings of matter, and by bots and worms, wounding and vellicating the nervours parts internally; long coſtiveneſs has ſometimes alſo occaſioned theſe diſorders. In all ſuch caſes, the original cauſe muſt principally be attended to.

In lethargic diſorders the horſe generally reſts his head with his mouth in the manger, and his pole often reclined to one ſide; he will ſhew an inclination to eat, but generally falls aſleep with his food in his mouth, and he frequently ſwallows it whole, without chewing: emollient glyſters are extremely neceſſary in this caſe, without the nervous balls recommended for the ſtaggers and convulſions: ſtrong purges are not requiſite, nor muſt you bleed in too large quantities, unleſs the horſe be young and luſty. In old horſes rowels and large evacuations are improper, but volatiles of all kinds are of uſe, when they can be afforded; an alterative purge may be given and repeated on his amendment.

This diſtemper is to be cured by theſe means, if the horſe is not old and paſt his vigour. It is a good ſign if he has a tolerable appetite, and drinks freely without ſlabbering, and if he lies down, and riſes up carefully, though it be but ſeldom.

But if a lethargic horſe does not lie down, if he is altogether ſtupid and careleſs, and takes no notice of any thing that comes near him; if he dungs and ſtales ſeldom, and even while he ſleeps and dozes, it is a bad ſign: if he runs at the noſe thick white matter, it may relieve him, but if a viſcid gleet that ſticks to his noſtrils like glue, which increaſing, turns to a profuſe running of ropy, reddiſh and greeniſh matter, it is an infallible ſign of great decay of nature; and that it will prove deadly.

Young horſes from four to ſix years, are very ſubject to convulſions, from bots in the ſpring; and the large coach-breed more than the ſaddle: they are ſeized without any previous notice, and if bots and worms are diſcovered in their dung, the cauſe ſeems to be out of doubt, more eſpecially if they have lately come out of a dealer's hands.

When this convulſion proceeds from a diſtemperature of the midriff, or any of the principal bowels, it is to be diſtinguiſhed from bots and vermin, by previous ſymptoms: the horſe falls off his ſtomach; and grows gradually weak, feeble, and diſpirited in his work; and turns ſhort-breathed with the leaſt exerciſe.

The lively deſcription of that univerſal cramp, or convulſion,

vulſion, called by ſome the ſtag evil, which ſeizes all the muſcles of the body at once, and locks up the jaws, ſo that it is impoſſible almoſt to force them open, we ſhall give in Mr. Gibſon's own words; who ſays, As ſoon as the horſe is ſeizēd, his head is raiſed with his noſe towards the rack, his ears pricked up, and his tail cocked, looking with eagerneſs as an hungry horſe when hay is put down to him, or like a high ſpirited horſe when he is put upon his mettle; inſomuch that thoſe who are ſtrangers to ſuch things, when they ſee a horſe ſtand in this manner, will ſcarce believe any thing of conſequence ails him; but they are ſoon convinced, when they ſee other ſymptoms come on apace, and that his neck grows ſtiff, cramped, and almoſt immoveable; and if a horſe in this condition lives a few days, ſeveral knots will ariſe on the tendinous parts thereof, and all the muſcles both before and behind, will be ſo much pulled and cramped, and ſo ſtretched, that he looks as if he was nailed to the pavement, with his legs ſtiff, wide and ſtraddling, his ſkin is drawn ſo tight on all parts of the body that it is almoſt impoſſible to move it; and if trial be made to make him walk, he is ready to fall at every ſtep, unleſs he be carefully ſupported; his eyes are ſo fixed with the inaction of the muſcles, as gives him a deadneſs in his looks; he ſnorts and ſneezes often, pants continually with ſhortneſs of breath: and this ſymptom increaſes continually till he drops down dead; which generally happens in a few days, unleſs ſome ſudden and very effectual turn can be given to the diſtemper.

In all theſe caſes the horſe ſhould firſt be bled plentifully, unleſs he is low in fleſh, old, or lately come off any hard continued duty, then you muſt be more ſparing of his blood; afterwards give the following ball:

Take aſſa fœtida half an ounce; Ruſſia caſtor powdered, two drams; valerian root powdered, one ounce; make into a ball with honey and oil of amber.

This ball may be given twice a day at firſt; and then once, waſhed down with a decoction of miſſletoe, or valerian, ſweetened with liquorice or honey: an ounce of aſſa fœtida may be tied up in a piece of ſtrong coarſe linen rag, and put behind his grinders to champ on.

The laxative purges and emollient glyſters ſhould be given intermediately to keep the body open; but when the former balls have been taken a week or ten days, the following may be given once a day with the valerian decoction.

Take cinnabar of antimony ſix drams, aſſa fœtida half an ounce, ariſtolochia, myrrh and bay berries, of each two drams: make into a ball with treacle and oil of amber.

This is the moſt effectual method of treating theſe diſorders; but when they are ſuſpected to ariſe from bots, and worms, which is generally the caſe, mercurial medicines muſt lead the way. Thus,

Take mercurius dulcis, and philonium, of each half an ounce: make into a ball with conſerve of roſes, and give the horſe immediately; half the quantity may be repeated in four or five days.

The following infuſion ſhould then be given, to the quantity of three or four horns, three or four times a day, till the ſymptoms abate; when the above nervous balls may be continued till they are removed.

Take penny-royal and rue, of each two large handfuls; chamomile flowers one handful; aſſa fœtida and caſtor, of each half an ounce; ſaffron and liquorice root ſliced, of each two drams: infuſe in two quarts of boiling water; pour off from the ingredients as wanted.

If the caſtor is omitted, add an ounce of aſſa fœtida.

The following ointment may be rubbed into the cheeks, temples, neck, ſhoulders, ſpines, of the back and loins, and wherever there is the greateſt contractions and ſtiffneſs.

Take nerve and marſhmallow ointment, of each four ounces; oil of amber two ounces; with a ſufficient quantity of camphorate ſpirit of wine: make a liniment.

To horſes of ſmall value give the following:

Take rue, penny-royal, and tobacco, of each a handful; aſſa fœtida an ounce; boil in a quart of forge-water: let the decoction ſtand on the ingredients, and give as the former.

When the jaws are ſo locked up that medicines cannot be given by the mouth, it is more eligible then to give them by way of glyſter: for forcing open the jaws by violence, often puts a horſe into ſuch agonies, that the ſymptoms are thereby increaſed. The infuſion above may be given for this purpoſe, or the following.

Take rue, penny-royal, and chamomile flowers, of each a handful, valerian root two ounces, boil in five pints of water to two quarts; in the ſtrained liquor diſſolve caſtor and aſſa fœtida, of each half an ounce, or of aſſa fœtida alone one ounce, common oil four ounces. Give this glyſter once a day.

In this caſe alſo he muſt be ſupported by nouriſhing glyſters, made of milk pottage, broths, &c. which muſt be given to the quantity of three or four quarts a day; glyſters of this kind will be retained, and abſorbed into the blood; and there have been inſtances of horſes thus ſupported for three weeks together, who muſt otherwiſe have periſhed.

Mr. Gibſon mentions ſome extraordinary inſtances of ſucceſs in caſes of this ſort by theſe methods, and repeated frictions, which are extremely ſerviceable in all convulſive diſorders, and often prevent their being jaw-ſet; they ſhould be applied with unwearied diligence every two or three hours, wherever any ſtiffneſs or contractions on the muſcles appear, for a horſe in this condition never lies down till they are in ſome meaſure removed.

He takes particular notice of a horſe, whoſe jaws were ſo locked up for three weeks, that both food and medicine were forced to be given by glyſter; that not having recovered the uſe of his jaws for a fortnight, though he now moved

moved them with leſs ſtiffneſs, he was determined, from the known relaxing power of opium, to give him half an ounce of it, diſſolved in one of his glyſters, the good effects of which were ſo evident, by a general amendment, that he was encouraged to continue it in the following manner.

Take Matthew's pill, and aſſa fœtida, of each an ounce: make into a ball.

This ball he gave for one doſe, and repeated once: and by this, and the uſe of the nervous medicines given twice a week, and gentie purging, the horſe was perfectly recovered.

The uſe of rowels in theſe caſes is generally unſucceſsful, the ſkin being ſo tenſe and tight, that they ſeldom digeſt kindly, and ſometimes mortify; ſo that if they are applied, they ſhould be put under the jaws, and in the breaſt.

The red hot iron ſo frequently run through the foretop and mane, near the occipital bone, for this purpoſe, has often been found to have deſtroyed the cervical ligament. *See the article* ROWEL. *Bartlet's Farriery*, *p.* 78.

Sheep are alſo ſubject to the ſtaggers, and the beſt remedy they find for it is, to drive them to change of grounds often, to keep the grounds from tainting.

"I obſerve, ſays Mr. Liſle, that thoſe lambs which die of the ſtaggers, do not die till they begin to eat graſs, and of thoſe the fineſt and luſtieſt; whence I conclude, that it is not the cold weather alone that brings the ſtaggers, but from their feeding on cold watery graſs in the months of March and April, which makes them abound in watery humours in the bodies, which the cold winds ſeize on and chill, and bring thoſe cramps and aches into their limbs. It is obſerved this diſeaſe is much prevented by the early folding of lambs, and with good reaſon, for thereby, in the cold nights, the lambs are kept warm, and alſo prevented from eating ſo much graſs as they otherwiſe would, whereby ſuch watery humours are fed. *Liſle's Huſbandry*, *vol.* II. *p.* 210.

STAGGERWORT. *See the article* RAGWORT.

STAKE, a piece of wood, or ſtrong ſtick fixed in the ground.

STALE, urine.

STALK, the ſtem, or ſtock of a plant.

STALL, a crib at which a horſe is fed, or where any horſe is kept in a ſtable.

STALL-FED, fed with dry feed, not with graſs.

STALLION, a ſtone horſe, deſigned for the covering of mares, in order to propagate the ſpecies. *See the article* HORSE.

STAMWOOD, the root of trees grubbed up.

STANDARDS, or *Standrels*, ſignify the young trees reſerved at the felling of woods, for the growth of timber.

STANDARDS, alſo imply fruit trees, intended to grow in an open expoſure, and not to be hacked and mangled with the knife, as the dwarf trees, and thoſe planted againſt walls are.

STANK, a dam, or bank to ſtop water.

STANNER-WORT. *See the artitle* RAG-WORT.

STAVERS. *See the article* STAGGERS.

STEE, a ladder.

STEM, that part of a plant ariſing from the root, and which ſuſtains the leaves, flowers, fruits, &c.

STEEPS, certain preparations for ſteeping of corn intended to be ſown. *See the article* SEED.

STEELE, a ſtalk, a handle.

STEER, a young bullock.

STEG, a gander.

STERCORARY, a collection of dung properly ſecured from any injuries of the weather.

In collecting manures from time to time, as they come to hand, farmers generally keep them together in what they call dung-hills, where they remain expoſed to the heat of the ſun, the waſhing of rain, and drying winds: by which means all their virtue is drawn forth, and carried away. M. Evelyn juſtly cenſures this wrong practice, and at the ſame time gives the following directions for making a ſtercorary, to contain the compoſt collected by huſbandmen.

Dig a ſquare or oblong pit, of the ſize ſuited to the quantity of compoſt wanted, or proportioned to the extent of the ground intended to be manured. Let the ſide next the fields be made ſloping, ſo as to receive a cart to load or unload eaſily. Let the bottom be well paved, and both the ſides lined, unleſs it be made in a bed of clay or chalk, that it may be capable of retaining water like a ciſtern; for it is of great importance, as Columella obſerves, that the dung be well ſoaked in liquor, in order to deſtroy the vegetative faculty of the ſeeds of weeds which may chance to be mixed with it, or the litter. If channels, or gutters, can be directed to this pit, from the ſtables and offices about the houſe, they will be of great ſervice. Mr. Evelyn is of opinion that this ſtercorary ſhould be under cover, ſo as at leaſt to hinder downright rains from falling upon it:—but if care be taken to make the pit in a place where no running water, or ſprings can come to it, and if the farmer covers the dung, as it is collected, with a coat of mould, to prevent the ſun's exhaling, or the rain's waſhing away its richneſs, I cannot help thinking that the quantity of water which falls in rain, would not be more than requiſite to moiſten the mixture, and bring on that putrid fermentation which is neceſſary for the due incorporating and perfecting of the compoſt. It will, however, be right to have a ſhed to put over it occaſionally, in caſe the ſeaſon ſhould prove extremely wet.—Columella informs us, that the Romans covered their ſtercoraries with hurdles; but does not ſpeak of covering them with mould, as here directed.

The pit being thus prepared, the farmer's next ſtudy ſhould be to fill it with a compoſt ſuited to the nature of his land. Thus, if his ſoil is a ſtrong clay, a layer of dung ſhould be covered with a layer of ſand, rubbiſh of old houſes, or other ſubſtances already mentioned for the improvement of clay. Litter of all kinds becomes a good addition, becauſe it is ſlow in decaying, and if mixed with the clay, keeps its parts aſunder. The compoſt for meliorating clay may be carried out, and mixed with the earth, freſher than for any other ſoil; becauſe, in this ſtate, it will more effectually keep the particles of the clay ſeparated; and if ſome degree of its putrefaction is carried on in the ſoil, it will much more powerfully open it. If, on the contrary, the ſoil is ſand, the dung ſhould be mixed with clay, ſcouring of ponds, or other fat ſlimy ſubſtances, which may give conſiſtence to the ſand. And if the farmer is happy in a ſoil in which neither of the extremes

extremes prevail, he may then mix his manure with the richeſt mould he can find, and incorporate them well together, by frequent turning, before the compoſt is carried to the field. Columella thinks they are ſlothful huſbandmen, who, in thirty days, have not a load of dung of twenty buſhels, from each of the leſſer cattle, and ten loads from each of the larger ſort, by means of judicious mixtures with their dung. He thinks this mixture, or compoſt, moſt beneficial to corn, after it is a year old; becauſe it ſtill retains all its ſtrength, and does not then breed weeds.

"Many good effects, ſays Dr. Home, particularly that of hindering the oils from being volatilized, and of fixing them, will ariſe from a mixture of lime with theſe compoſts, after they are thoroughly rotted. But as many experiments have proved that quick-lime powerfully reſiſts putrefaction, it does not ſeem judicious to mix it with dung hills which are not ſufficiently putrefied, as it muſt ſtop that proceſs.

"There is a very great attraction betwixt quick lime and all oily bodies. It unites intimately with expreſſed oils. With this intention it is uſed in the manufacture of ſoap, to help the junction of the alkaline ſalts and oils. It muſt, therefore, attract the oils powerfully from the air and earth, diſſolve them, and render them miſcible with water: it muſt, from this reaſon, ſoon exhauſt the ſoil of all its oleaginous particles, if the farmer does not take care to ſupply them by dung or animal ſubſtances. Farmers have, by experience, diſcovered it to be a great impoveriſher of lands; but they did not know how it acted. Its operation is, to exhauſt the earth of its oils. The proper cure for this is, to mix dung with the lime, ſo that it may have ſomething to act on.

"Lime is a great diſſolver of all bodies, both vegetable and animal; but particularly the latter. We know how ſoon it reduces hair and woolen rags into a pulpy ſubſtance. This effect is ſo ſtrong, that in the common method of ſpeaking, it is ſaid to burn them. In this way it certainly operates in the earth, by diſſolving all animal and dry vegetable ſubſtances, and converting them to the nouriſhment of vegetables, at leaſt ſooner than otherwiſe they would be. Like other calcarious bodies, it is not diſſolvable but by acids. With theſe, a great effervescence happens, a ſolution of the calcarious body is made, and a neutral ſalt is formed from that conjunction. This neutral ſalt is always ſoluble in water, unleſs where the acid of vitriol is uſed." *Home's Principles of Vegetation, page* 69, 70.

The Society of Improvers in the Knowledge of Agriculture in Scotland, have paid great attention to the ſubject of compoſts, and are very particular in their inſtructions on this head, to ſeveral of their correſpondents. I gladly take this opportunity of paying the tribute of praiſe juſtly due to their public ſpirit, and congratulate them on the great ſucceſs which has attended their labours in many parts of their country. At the ſame time I cannot help regretting, that, though all our neighbours have ſet us ſo many examples of periodical inſtruction in this moſt uſeful art, there is not yet any inſtitution of that kind in England. It is to be hoped, that the Society for the Encouragement of Arts, Manufactures and Commerce, will ſoon take off this reproach, and not ſuffer it to be longer ſaid that agriculture lies neglected in this kingdom, where the people enjoy every advantage requiſite to promote it, in a far higher degree than the inhabitants of any other country in the world. The wealth of our farmers is incomparably greater; their property, and the tenure of their lands, are infinitely better ſecured; and the happieſt of ſoils and climates combine to reward their labour.

The Society in Scotland give to a gentleman who had written to them, and who had clay and lime at command, the following judicious directions for collecting a compoſt, or making a ſtercorary, for the improvement of a ſandy ſoil. "Take, ſay they, in the field intended to be manured, a head-ridge, the moſt conveniently ſituated for a ſtercorary. Plow it two or three times, as deep as can be in the cleaving way, if the ridge be high gathered, and harrow it well: then lay thereon your ſlimy clay, about a foot thick, leaving a part of the ground uncovered: next lay a thin layer of dung, another of clay, and after that a layer of unſlaked lime, at leaſt a foot thick: then throw up the earth left uncovered on each ſide. After this, repeat another layer of clay, and lime-ſtone, as before, and finiſh it with a layer of clay and ſea-wreck, covered with earth. The more of the ſlimy clay the better: for though it may be cold, yet it will not be the worſe for a ſandy hot ground. If you examine the clay, we doubt not but you will find it a very fat ſubſtance; being, as we conjecture, moſtly muſcle and other ſhells mixed with earth, brought by the tide and river Southeſque. On the coaſt of Lothian we found that ſlimy ſubſtance to be nothing elſe; and if it be ſo with you, it is certainly one of the beſt manures.

"After this ſtercorary has ſtood ſix weeks or two months, incorporating and fermenting, turn and mix it; and that this work may be performed to the better purpoſe and with as ſmall an expence as poſſible, yoke your plow, enter upon your ſtercorary with a cleaving furrow, and continue repeating the plowings the ſame way, until the very bottom of the ſtercorary be ripped up; then harrow it: it is impoſſible to over-do it. If it be very cloddy, it ſhould be harrowed between the plowings. Begin then in the middle, and plow again and again in the gathering way, until it be brought into as narrow bounds, and be raiſed as high as poſſible. Let all that the plow has left be gathered up, and thrown with ſhovels on the top. Every ſuch turning and heaping occaſions a new ferment, and improves the manure. If the ſeeds of barley, or of any other quick growing vegetable, were ſprinkled thin on the ſtercorary, and the plants buried in it, when fulleſt of ſap, before they come to ſeed, by turning or more heaping, the manure would be improved." This might be repeated ſeveral times in the courſe of the ſeaſon; for the practice has been found ſucceſsful. *Maxwell's Collection, page* 26.

In another place, they obſerve that ſuch a ſtercorary may be turned in the ſame manner as ground is trenched. The higher it is raiſed, the better. Each turning will make it heat like a garden hot-bed, and this fermentation will reduce it to a fine fat mould. If the firſt heat ſhould go off (which may eaſily be known by thruſting a pole into it) before it has produced this effect, it may be turned over again, and will take a new heat, which is of great advantage to it, beſides the better mixing of the ſeveral manures. About fifty or ſixty cart loads of this compoſt are uſed upon an acre of ground. I have been the more particular in extracting this account, becauſe any farmer by attending to the rules here given, may ſuit his compoſt to the nature of his ſoil. Where the ſoil varies, he will do well to have another ſtercorary, properly compoſed,

poſed, in a convenient part of the field he intends to manure.

The ſame ſociety, in their directions for the management of ſheep's dung, where the ſheep are houſed, or fed under cover, during the inclemency of the winter, adviſe laying under them ſubſtances ſuited to the nature of the ſoil intended to be improved. A layer of ſand, for inſtance, for ſtiff land, will be greatly benefited by being covered with a couch of litter in the ſheep houſe. When their dung becomes troubleſome or offenſive to them, or begins to make them dirty, the whole ſhould be removed to the ſtercorary. But if the dung of the ſheep is to be laid on a ſandy ſoil, clay, or any ſuch ſubſtance, though covered with litter, it would ſoon become wet, and too cold for the ſheep to lie on. It would therefore be better, in this caſe, to ſpread a thick couch of litter under the ſheep, and mix this in the ſtercorary with the lime, &c. by which means the ſame advantage may be obtained, without injury to the cattle. If loam, or a rich mould, be laid under ſheep, the judicious farmer will be careful to collect a ſufficient quantity of it, when it may be got dry, in the ſummer. Whatever is uſed for this purpoſe, ſhould be renewed as often as it is ſufficiently impregnated by the urine and dung of the ſheep.

The well preparing of mixed dung, is, as Mr. Worlidge rightly inſiſts, a piece of huſbandry by no means to be neglected; for the more and better the dung is, the greater will be the crop; and an increaſe of the crop will augment the quantity of dung. On the contrary, a decay in the dung makes a decay in the crop, &c. The riſe, or fall, of the value of many farms in this kingdom muſt therefore neceſſarily depend upon the good or bad management of this eſſential part of huſbandry. *See the article* DUNG-HILL.

The carriage being a principal article of the expence of manuring land, the farmer ſhould endeavour as much as poſſible, to ſave this expence; for which purpoſe he ſhould contrive to dreſs the lands of his farm, that lie at the greateſt diſtance from the home ſtead, with ſuch manures as are of the lighteſt carriage; ſuch as ſoot, coal, or peat aſhes, pigeon dung, lime, &c. and with the ſheep fold.

Next to theſe in cheapneſs, is making compoſts upon the head lands, as recommended above by the Edinburgh Society. In arable fields, the earth of the head lands is contiuually accumulating by the plough turning upon them, inſomuch that in no long courſe of time, the head lands are thereby raiſed ſo high above the adjoining parts of the field, that they obſtruct the current of the water, that ſhould be diſcharged there from the furrows, and keep the land wet; for which reaſon it is adviſeable to carry the earth frequently off the head-lands, ſo that they may lie lower than the contiguous ridges; and to turn this earth to the beſt account, it may be mixed and made into a compoſt, with dung or other manure, and afterwards carried and ſpread upon the field. If the headlands at the two oppoſite ends of the field are thus prepared, and the compoſt carried from each end, and ſpread till it meets in the middle, half the carriage will be ſaved, which will render this a cheap method of manuring.

Inſtead of carrying the compoſt upon the land as ſoon as it is mixed with the earth of the head-land, if the head lands are planted with potatoes in the ſpring, a good crop of them may be obtained, and the tillage beſtowed upon them will thoroughly mix the compoſt, and prepare it to be laid on the field.

But for ſuch lands as are ſituated near the farm-yard, it is beſt to collect the manure there: and if the farm-yard is laid regular, having a hard dry bottom, and the ſides riſing gradually all round, ſo as to form a kind of baſon, a great deal of excellent manure may be collected there, without loſing any of the dung or urine of the cattle: for this purpoſe ſome good mould ſhould be ſpread all over the yard, and fern, ſtraw, litter, or ſtubble upon the mould; and when that is trod and mixed by the cattle, add more mould and ſtraw. The cattle ſhould be foddered, and the dung from the ſtables regularly ſpread all over the yard, till the whole is ſufficiently raiſed, to be collected in heaps, and then covered with earth: this will prevent the dung being waſted by the ſun and drought; and the drainings from theſe heaps, being thrown up from time to time upon them, a moderate fermentation will be kept up, and great quantities of excellent manure will be thus obtained.

Thoſe who give directions in what manner to prepare compoſts, commonly adviſe to lay ſtrata of different materials, clay, lime, dung, &c. each ſix or eight inches, or even a foot thick; but when clay or ſtrong earth is laid ſo thick, the fermentation of the intermediate layers, not being ſtrong enough to penetrate thoſe thick ſtrata; when the compoſt is turned, they riſe in great lumps, and muſt be ſeveral times turned and broken before the whole can be thoroughly mixed and incorporated. It is therefore a much better way to lay the ſeveral ingredients in thin layers at firſt, and ſtill better to lay them in heaps, round the foundation of the compoſt dung-hill: and if men are employed, one or more at each heap to throw up and ſpread them equally over the compoſt heap, ſtill as it riſes, the materials will thus be well mixed at firſt, the fermentation will go on regularly, and the compoſt will be prepared, and ready to lay on the land ſooner, and in much better order, than if made of thick layers of ſtrong earth.

STERILE, barren, unfruitful.

STEW, a ſmall kind of fiſh-pond, the peculiar intention of which is to maintain fiſh, and keep them for the daily uſes of a family.

STONE-BREAK, or Engliſh ſaxifrage, a perennial plant common in paſture grounds. The root has a ſharpiſh and aromatic taſte. The ſtalks are round, ſtreaked, and reddiſh towards the bottom. The leaves are ſmooth, of a dark green, and divided twice into long, narrow, ſharp ſegments. The foot-ſtalks are membranaceous at the baſe. The flowers grow in looſe umbels; and of a pale yellow colour. The ſeeds are oval, ſtreaked, and red at the top.

"Every farmer, ſays a correſpondent of the editors of the Muſeum Ruſticum, knows which ſort of graſs he would wiſh to have predominant in his meadows: it would ſurely be very eaſy for him to ſave ſome of the ſeeds of ſuch graſs, and propagate it a-part till he had ſaved ſufficient to ſow, ſuppoſe an acre of land with it, pure and unmixed: when arrived at this point, he might propagate it as extenſively as he thinks proper.

"I muſt not however forget the chief intended ſubject of my letter, which is, to recommend to your readers the ſaxifrage as a plant proper to be intermixed with the graſs of their meadows.

"I have now in my holding above thirty acres of mea-

dow land, which fortunately for me bears a graſs that needs no improvement; though this I in part attribute to my having drained my land properly ſome years ago, ſince which the bite is much improved.

"Amongſt this graſs in my meadows there grows a conſiderable quantity of ſaxifrage; which, in the opinion of all the dairy-men in my neighbourhood, is the reaſon my cheeſe is ſo particularly good.

"Now I ſhould imagine that when a farmer has plowed up a ſoul meadow, and intends ſowing it with good graſs ſeed, it would be no difficult matter to procure a ſprinkling of ſaxifrage-ſeed to mix with it: this would certainly be of ſervice; and we ſhould not deſpiſe this excellent plant becauſe it is common, and not far-fetched: there is great plenty of it in the Netherlands, in their fineſt cow-paſtures; and that I have often heard aſſigned as a reaſon for their having ſuch quantities of cheeſe of a ſuperior quality; though I muſt at the ſame time own, I have in London taſted ſome Dutch cheeſe, ſtuffed full of cloves, which was not the beſt in the world; but this might have been an accident, for they ſay their cheeſe is in general excellent.

"But, to return to my immediate ſubject, I would by all means recommend the propagation of the ſaxifrage plant in meadows, not only on account of its great uſe in improving the quality of cheeſe, and butter alſo, which it does, but becauſe it is a native of our iſland, and there is no danger of its ſucceeding to the farmer's wiſh; which cannot be ſaid of every plant recommended for cultivation.

"But it muſt be remembered, that I do not recommend it to be cultivated alone; I never tried it in that manner: that it will thrive very well when mixed with good meadow graſs, daily experience convinces me; and this method it is I urge." *Muſeum Ruſticum, vol.* I. *page* 472.

The burnet, cultivated to ſo much advantage by Mr. Rocque and others is a ſpecies of the ſaxifrage. *See the article* BURNET.

STONE, a hard ſolid body, neither malleable, fuſible by fire, nor ſoluble in water, formed by ſucceſſion of time in the bowels of the earth.

It has been argued, and is not yet determined, whether ſtones are hurtful, or beneficial to arable lands. Examples are not wanting on both ſides of the queſtion; though, in general, it ſeems rather to be carried for them. However, nothing can excuſe leaving a ſtone in any ground ſo large as to interrupt the plough. If they are very large, they ſhould be blown to pieces with gun-powder, and then be carried off. Some ſpots, very fertile in ſeveral kinds of grain, ſeem to conſiſt of nothing but ſtones; and inſtances are given of fields being rendered barren by taking away the ſtones which covered them. Theophraſtus accounts for this in a hot country, where it happened to the Corinthians, by ſaying, that the ſtones ſhelter the earth from the ſcorching heat of the ſun, and thereby preſerve its moiſture. The ſame holds true even in our colder latitude, where the heat of the ſun is leſs apt to hurt us; and Mr. Evelyn is clearly of opinion that huſbandmen rather impoveriſh, than improve, thoſe grounds which are almoſt covered with ſtones, eſpecially where corn is ſown, if they pick them off too minutely; becauſe they thereby expoſe the land too much to the effects of heat and cold. Certain it is, that a moderate mixture of ſmall gravel preſerves the earth both warm and looſe, and prevents too ſudden exhalations. But it ſeems highly probable that there muſt be ſome farther reaſon, beyond what has yet been aſſigned, for the benefit ariſing from ſtones. The example already given of the ſtone uſed in Oxfordſhire; and a remarkable incident which happened to M. Du Hamel, give great room to think that the ſtones which are thus beneficial, are of the lime-ſtone or calcarious kind.

"The ſtone which is uſed for building at Denainvilliers, ſays M. Du Hamel, is very hard. It bears poliſhing like marble, and is here and there intermixed with ſhells, ſome of which are filled with a kind of oaker, and others contain a cryſtalline ſubſtance. This ſtone is very fit to make lime of. Some workmen, who were building about our houſe, cut pieces of this ſtone upon a graſs-plat. When they had done their work, the rubbiſh was cleared away, and nothing was left upon the graſs but the duſt and very ſmall fragments, which had fallen from the ſtones in cutting them. The next year, the graſs grew ſurpriſingly thick in all the places where theſe ſtones had been cut, was much taller and greener than any where elſe, and preſerved its vigour for ſeveral years. One would ſcarcely have thought that ſo hard a ſtone, reduced to powder would have produced an effect like that of marle. The goodneſs of lime, as a manure, is, perhaps, chiefly owing to the fineneſs of the powder, to which the lime-ſtones are reduced by calcination.

"This fact may help to clear up another, which cannot have eſcaped the notice of thoſe who attended to the differences of ſoils. They muſt have obſerved ſome grounds ſo thickly covered with ſtones, that ſcarce any thing elſe is ſeen after a heavy ſhower of rain. Yet ſome of theſe lands are very fertile, and produce fine wheat. I know not whether I am miſtaken, but I think I have obſerved that this fertility is found only in fields where thoſe ſtones are calcarious. It is very probable that the duſt which is formed by the mutual rubbing of theſe ſtones contribute to that fertily. *Culture des Terres, tom. V. page* 220.

The farmer may eaſily inform himſelf whether this be the caſe; and if it is, he has a certain rule to go by in the management of ſtones; viz. by trying with aqua fortis, or ſpirit of ſea-ſalt, as mentioned before, whether they are calcarious or not: for every ſtone on which the ſpirit does not effervеſce, is of no uſe, and therefore ſhould be removed, as an impediment to the neceſſary labour. However, the prudent huſbandman will make the experiment of clearing his land, firſt on a ſmall ſpot; that he may be ſure of the ſucceſs, before he embarks in a greater expence. *See the article* LIME.

STONE, alſo denotes a certain quantity or weight of ſome commodities.

A ſtone of beef at London is the quantity of eight pounds; in Herefordſhire, twelve pounds; in the north ſixteen pounds.

A ſtone of wool, according to a ſtatute made in the eleventh year of the reign of Henry VII. is to weigh fourteen pounds, but in ſome places it is more, in others leſs; as in Glouceſterſhire fifteen pounds, in Herefordſhire twelve pounds.

A ſtone, among horſemen, is the weight of fourteen pounds.

STONY LANDS, ſuch as are full of flints, pebbles, or ſmall fragments of free-ſtone.

Theſe lands, in many places, yield good crops, and the general rule is, that in ſtiff and cold lands the ſtones ſhould

ſhould be as carefully picked out as poſſible, but in light and dry grounds they ſhould be left. In Oxfordſhire they have great quantities of a lean earth, and a ſmall rubble ſtone, or a ſour ſort of land mixed with it; this is ſometimes very full of weeds, and ſometimes very clear of them. If they are weedy they fallow them late; but if they are ſcary, as they call it, that is, if they have a ſward upon them, they either fold them in winter, and add ſome hay-ſeed to the ſheep's dung, to bring up the graſs; or elſe they lay old thatch or ſtraw, and dung upon it: for they reckon that if thoſe lands have no ſward upon them before they are fallowed, they will by no means be brought to bear a good crop, but a great deal of May-weed, and other uſeleſs weeds. In September, November, and December, they fallow as the ſward directs them: if this be done in either of the two laſt months, they call it a winter fallowing; and never ſtir it again, till they plow it, and ſow it with barley: and thoſe lands are reckoned to do better than if finely tilled. They will bear wheat and meſlin in a kindly year, and large crops of barley, if they are well managed, and kept in good heart.

They always fallow thoſe lands every other year, unleſs they ſow peas upon them; ſometimes they ſow them with lentils; and when they are quite worn out, they lay them down for clover or rey-graſs.

STOOKING, SHOCKING, or STACKING, the ſetting the ſheaves into ſhocks, the better to guard it from the rain.

A correſpondent of the editors of the Muſeum Ruſticum, has given us the following method of ſtacking, or ſtooking corn to preſerve it from the wet, and in which ſituation it may remain in the field ſix weeks or two months, without any danger from the inclemency of the weather.

"They ſet one ſheaf upright with the ears uppermoſt; and round that they place a circle of many other ſheaves, with their ears uppermoſt, inclining on the firſt ſheaf; and when ſo placed they look like the figure of an extinguiſher.

"They then lay an horizontal circle of ſheaves, with all the ears in the centre, and cover thoſe ears with a looſe ſheaf or two.

"Thus placed they are protected from all wet, and may remain in the field ſix weeks, or two months, as ſafe as in a barn; and this method of ſtacking has been adopted in Suſſex, Surry, Kent, and many other ſouthern counties, to the great benefit of the farmers and the public." *Muſeum Ruſticum, vol.* II. *page* 35.

In a ſubſequent number of the ſame work, the Rev. Mr. Comber, of Eaſt-Newton, in Yorkſhire, has made ſome remarks upon the above method of ſtooking, and alſo deſcribed the method followed in Yorkſhire.

"It is to be wiſhed, ſays he, that this gentleman had been more particular in his account. He does not tell us whether this ſtack, as he calls it, is made immediately after the wheat is gathered, or after it has had field-room in ſome other manner, though this circumſtance is very material towards a right judgment of its uſefulneſs, and even of the expedition. He does not tell us, whether by a circle of many other ſheaves he means a circle of one row of ſheaves, or of more, though this circumſtance too is very material.

"I will now give a ſhort, but, I hope, ſufficient deſcription of the method of ſtooking uſed in Yorkſhire, &c.

"Ten ſheaves are diſpoſed in two rows, each row leaning againſt the other: then two ſheaves are laid on the top, ſo as to meet at the centre with their tails, and to ſlope downwards.

"Now to compare the methods, I muſt obſerve, firſt, that in your correſpondent's the ſheaves appear to be ſet ſo cloſe as to exclude a free courſe of air, moſt eſſential to give, preſerve, or reſtore dryneſs to corn; whereas in ours, the air has a free courſe, whether it bears againſt one or other end of the ſtook, or even againſt either ſide of it.

"Secondly, in your correſpondent's method, only ſome looſe ears are laid as a cover to the whole ſtock; and thoſe cannot reaſonably be ſuppoſed long to reſiſt the beating of the rain, but to tranſmit it to all, or many of the ears below them, which they are ſuppoſed to cover: and if we conſider what violent winds often viſit us in, and ſoon after, the harveſt, we ſhall readily allow, that theſe looſe ears may reaſonably be expected to be blown off, and become no cover; nay, to be blown about and away, and often totally loſt; whereas, in our method, the cloſeneſs and weight of two of the beſt ſheaves in the twelve may reaſonably be ſuppoſed to be a good cover, and to continue ſo, and hardly to be blown off by any wind, if carefully laid on; at leaſt, not to be blown away, but ſo as ſoon to be replaced.

"Thirdly, the flat poſition of your correſpondent's cover, muſt make it extremely liable to receive all the rain that deſcends, and tranſmit it to what lies beneath; whereas the ſloping poſition of our cap ſheaves, neither expoſes them to receive directly, nor to retain, nor tranſmit the rain to the corn below, but to throw it off, eſpecially as the tails of the ſheaves, in which the ſtraw is thickeſt and ſtrongeſt, receive the moſt of the rain, which can do them little or no harm, and eſpecially if the tails of theſe ſheaves be thruſt cloſely together. In ſhort, gentlemen, your correſpondent's method ſeems to threaten that dreadful malady, mow-burn, whilſt ours gives the corn all poſſible guard againſt it, viz. acceſs of ſun and wind.

"It is of great conſequence to the public, as well as individuals, to guard againſt every ſpecies of deſtruction to ſo valuable a crop as wheat is, in every ſtage, but more eſpecially in its laſt, in which almoſt all the expence is over: therefore, the above gentleman's aſſertion, that his method of ſtacking is adopted in Suſſex, Surry, Kent, and many other ſouthern counties, made me more ſolicitous to examine it; and ſince, on a fair compariſon with our Yorkſhire method, it appears to have every diſadvantage, I perſuade myſelf I am doing my duty to my country, by ſhewing to many counties a much better method than that which they have adopted." *Muſeum Ruſticum, vol.* II. *page* 250.

STOOMING *of wine*, is the putting bags of herbs, or other ingredients into it. *See the article* WINE.

STOOP, a poſt fixed in the earth.

STOT, a young bullock; a ſteer.

STOVER, fodder for cattle.

STOUND, a wooden veſſel to put ſmall beer in.

STOWK, the handle of a pail: alſo a ſhock of twelve ſheaves.

STOWRE, a round of a ladder; a hedge-ſtake: alſo the ſtaves in the ſides of a waggon, in which the eve-rings are faſtened.

STRAIN, or SPRAIN, a violent extenſion of the ſinews or tendons of ſome muſcle, whereby the tendinous fibres are over ſtretched, and ſometimes ruptured, or broken.

To form therefore a true idea of theſe diſorders, let us firſt conſider every muſcle, and tendon, as compoſed of

ſpringy elaſtic fibres, which have a proper power of their own, to contract and extend themſelves: or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus then, if by a violent extenſion of this catgut, you had ſo overſtretched it, as to deſtroy its ſpringineſs, or elaſticity, and was inclined to recover its loſt tone; would you for that purpoſe think of ſoaking it in oil? And is not the method of treating ſtrains, or overſtretched muſcles and tendons, full as prepoſterous, when you bathe or ſoak them in oily medicines, at a time when they want reſtringents to brace them up? Yet cuſtom has ſo eſtabliſhed this practice, and fallacious experience ſeemingly ſo confirmed it, that it would be a difficult taſk to convince the illiterate, and prejudiced, of the abſurdity; who, by attributing effects to wrong cauſes, are led into this error, and the oils uſurp the reputation that it due only to reſt and quiet: they ſeem however to be aware of the ill conſequences, by their adding the hot oils, as ſpike, turpentine, and origanum; which, though they in ſome meaſure guard againſt the too ſuppleing quality of the other oils; yet the treatment is ſtill too relaxing to be of real ſervice.

And indeed in all violent ſtrains of either tendon or muſcles, whatever opinion we may entertain of bathing and anointing with favourite noſtrums, which often ſucceed in ſlight caſes, where perhaps bandage alone would have done, yet it is the latter, with proper reſting the relaxed fibres, till they have thoroughly recovered their tone, that are the chief things to be depended on; and frequently ſome months are neceſſary for effecting the cure.

All violent ſtrains of the ligaments, which connect the bones together, eſpecially thoſe of the thigh, require time, and turning out to graſs, to perfect a recovery. External applications can avail but little here, the parts affected laying too deep, and ſo ſurrounded with muſcles, that medicine cannot penetrate to them. The ſooner in theſe caſes, a horſe is turned out to graſs, the better, as the gentle motion in the field will prevent the ligaments and joint oil, from thickening, and of courſe the joint itſelf from growing ſtiff; nor do I believe that firing, ſo commonly practiſed in this caſe, is of half of the conſequence as reſt, and turning out for a conſiderabe time; which by the bye, is always adviſed at the ſame time the horſe is fired. I could not avoid ſaying thus much, in order to ſhew the great advantages of reſt in all ſtrains, and that no horſe ſhould be worked till he is thoroughly recovered.

When a horſe's ſhoulder is overſtrained, he does not put out that leg as the other, but to prevent pain, ſets the ſound foot hardly on the ground, to ſave the other; even though he be turned ſhort on the lame ſide, which motion tries him the moſt of any. When trotted in hand, inſtead of putting his leg forward in a right line, he forms a circle with the lame leg; and when he ſtands in the ſtable, that leg is advanced before the other.

In order to cure this lameneſs, firſt bleed him, and let the whole ſhoulder be well bathed three times a day with hot verjuice or vinegar, in which may be diſſolved a piece of ſoap; but if the lameneſs continues without ſwelling, or inflammation, after reſting two or three days, let the muſcles be well rubbed for a conſiderable time, to make them penetrate, with good opodeldoch, or either of the following mixtures:

Take camphorated ſpirits of wine two ounces; oil of turpentine one ounce; this proportion will prevent the hair coming off.

Or,

Take the beſt vinegar half a pint; ſpirit of vitriol, and camphorated ſpirit of wine, of each two ounces.

When the ſhoulder is very much ſwelled, it ſhould be fomented with woollen clothes (large enough to cover the whole) wrung out of hot verjuice and ſpirit of wine; or a fomentation prepared with a ſtrong decoction of wormwood, bay-leaves, and roſemary, to a quart of which may be added half a pint of ſpirit of wine.

A rowel in the point of the ſhoulder in this caſe often does great ſervice; eſpecially if the ſtrain has been very violent, and the ſwelling very large; but as to boring up the ſhoulder with a hot iron, and afterwards inflating it, is both a cruel and abſurd treatment; and the pegging up the ſound foot, or ſetting on a patten ſhoe, to bring the lame ſhoulder on a ſtretch, is a moſt prepoſterous practice, and directly calculated to render a horſe incurably lame; for it can only be neceſſary in caſes the very oppoſite to this, where the muſcles have been long contracted, and we want to ſtretch them out.

Where poultices can be applied they are at firſt undoubtedly very effectual, after bathing with hot vinegar or verjuice, and are to be preferred greatly to cold charges, which by drying ſo ſoon on the part, keep it ſtiff and uneaſy: let them be prepared with oatmeal, rye-flour, or bran boiled up in vinegar, ſtrong beer, or red wine lees, with lard enough to prevent their growing ſtiff; and when by theſe means the inflammation and ſwelling is brought down, bathe the part twice a day with either of the above mixtures, opodeldoch, or camphorated ſpirits of wine; and roll the part three or four inches, both above and below, with a ſtrong linen roller, of about two fingers width, which will contribute not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themſelves.

As opodeldoch is variouſly made, and thoſe uſually ſold in the ſhops do not ſeem ſo well calculated for horſes, we ſhall inſert the following, as better adapted to this purpoſe, and recommend it to be kept ready prepared for the uſe of the ſtable; it being not only very proper for the above uſe, but for bruiſes, cold ſwellings, benumbed parts, and for diſperſing many other ſuch ſort of tumours: it may occaſionally alſo be given internally for the gripes from wind, or taking cold; for the ſtrangury alſo, and as a cordial; one ounce, or more, may be taken for a doſe in a pint of ale.

Take Jamaica pepper four ounces, Winter's bark, carraway ſeeds, laurel, and juniper berries bruiſed, of each two ounces; roſemary, marjoram, and lavender flowers, of each one ounce; rectified ſpirit of wine, three pints; let them digeſt in a warm place ten days, then ſtrain off the tincture, and diſſolve in it Venice ſoap a pound and a half; camphor three ounces; Barbadoes tar four ounces; oil of turpentine ſix ounces; oil of amber two ounces; mix and make a liniment.

In ſtrains of the coffin joint that have not been diſcovered in time, there will grow ſuch a ſtiffneſs in the joint, that

that the horſe will only touch the ground with his toe; and the joint cannot be played with the hand; the only method here is repeated bliſtering, and then firing ſuperficially.

Strains of the back ſinews are very common, and are eaſily diſcovered by the ſwelling, which extends ſometimes from the back ſide of the knee down to the heel, but for the moſt part the horſe ſets that leg before the other. The tendon ſhould be well bathed three or four times a day with hot vinegar; and if much ſwelled, apply the poultices above recommended, and when the ſwelling is down, bathe with the mixtures above, or with camphorated ſpirit of wine and oil of amber, in which is diſſolved as much camphor as the ſpirits will take up, and roll up the tendon with a proper bandage, or laced ſtocking; which laſt, properly fitted to the limb, might be wore to great advantage, not only in theſe kinds of injuries, but in moſt others, where there is a diſpoſition to the greaſe, or other ſwellings of the limbs, from weak and relaxed fibres. Curriers ſhavings wetted with vinegar have been found uſeful for this purpoſe; as has alſo tar and ſpirit of wine: but where the tendon has ſuffered by repeated injuries of this kind, the caſe will demand bliſtering, firing, and proper reſt.

Strains of the knees and paſterns ariſe frequently from kicks, or blows; if they are much ſwelled, apply firſt the poultices; and when the ſwelling is abated, bathe with the above, or the following.

Take vinegar one pint; camphorated ſpirits of wine, four ounces; white vitriol, diſſolved in a little water, two drams.

Or,

Take the whites of three or four eggs, beat them into a froth with a ſpoon; to which add an ounce of roach allum finely powdered; ſpirit of turpentine, and wine, of each half an ounce; mix them well together.

The following is alſo much recommended by the French writers, and has been found very ſucceſsful in ſome old ſtrains, when other remedies have failed.

Take one pound of tar, and two of rectified ſpirit of wine, ſtir them together over a fire till they incorporate (but take care the flame does not catch the ſpirits) then add two ounces of bole finely powdered; and a ſufficient quantity of oatmeal to bring it to the conſiſtence of a poultice; to which add lard enough to prevent its growing dry; apply it ſpread on cloth twice a day.

As great weakneſs remains in the paſterns after violent ſtrains, the beſt method is to turn the horſe out to graſs till he is perfectly recovered; when this cannot be complied with, the general way is to bliſter and fire.

When a horſe is lame in the ſtifle, he generally treads on his toe, and cannot ſet the heel to the ground. Treat him at firſt with the vinegar and cooling reſtringents; but if a large ſwelling with puffyneſs enſues, foment it well with the diſcutient fomentation till it diſperſes; and then bathe the part with any of the above medicines.

A lameneſs in the whirle bone and hip, is diſcovered by the horſe's dragging his leg after him, and dropping backward on his heel when he trots. If the muſcles of the hip are only injured, this kind of lameneſs is cured eaſily; but when the ligaments of the joint are affected, the cure is often very difficult, tedious, and uncertain. In either caſe, at firſt bathe the parts well with the cooling medicines, four or five times a day; in the muſcular ſtrain, this method alone may ſucceed, but in the ligamentous, it is reſt and time only can reſtore the injured parts to their proper tone.

Strains in the hock are to be treated by ſoaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakneſs and pain, uſe the fomentation. If a hardneſs ſhould remain on the outſide, it may be removed by repeated bliſtering; if within, it may be out of the power of any external applications to remove; however, the joint ſhould be fired gently with ſmall razes or lines pretty cloſe together, and then covered with a mercurial plaiſter. To the diſcutient fomentation above mentioned may be added crude ſal armoniac, with a handfull of wood-aſhes boiled in it.

The bliſtering ointment for the above purpoſes may be found under the article SPAVIN; but the ſublimate ſhould be omitted.

The firing uſed for the ſtrengthening relaxed ſinews or tendons, ſhould act only on the ſkin, which by contracting and hardening it all round the ſinews, compreſſes them more firmly like a bandage. *See the article* FIRING. *Bartlet's Farriery, pag.* 224.

STRANGLES, a diſtemper to which colts and young horſes are very ſubject; and begins with a ſwelling between the jaw-bones, which ſometimes extends to the muſcles of the tongue; and is attended with ſo great heat, pain and inflammation, that ſometimes till matter is formed the horſe ſwallows with the utmoſt difficulty.

The ſymptoms are extraordinary heat and feveriſhneſs, with a painful cough, and a great inclination to drink without being able; ſome horſes loſing their appetites intirely, others eating but little, by reaſon of the pain which chewing and ſwallowing occaſion: when the ſwelling begins on the inſide of the jaw-bones, it is much longer in coming to matter than when more to the middle; when it ariſes among the glands, and divides into ſeveral tumors, the cure is generally tedious, as it breaks in different places, and when it forms upwards on the wind pipe and gullet, there is ſometimes danger of ſuffocation, unleſs the ſwelling ſoon breaks. But the moſt dangerous kind is when, beſides the above ſymptoms, the horſe runs at the noſe; this by ſome is called the baſtard ſtrangles.

As this diſorder ſeems to be critical, the moſt approved method is to aſſiſt nature in bringing the ſwellings to maturity, by keeping them conſtantly moiſt with ointment of marſhmallows, and covering the head and neck with a warm hood. But as all ſwellings in glandular parts ſuppurate ſlowly, the following poultice may be applied hot twice a day; it is alſo a very proper one to ripen, or bring any other ſwelling to matter.

Take leaves of marſhmallows ten handfuls; white lilly-root half a pound; linſeed and fenugreek ſeed bruiſed, of each four ounces; boil them in two quarts of water till the whole is pulpy, and add four ounces of ointment of marſhmallows, and a ſufficient quantity of hogs lard, to prevent its growing ſtiff and dry.

In

In five or six days, by these means, the matter is generally formed, and makes its way through the skin; and if the discharge is made freely and with ease, the opening need not be inlarged, but should be dressed with the following ointment spread on tow, still continuing the poultice over it to promote the digestion, and prevent any remaining hardness.

Take rosin and Burgundy pitch, of each a pound and a half; honey and common turpentine, each eight ounces; yellow wax four ounces: hogslard one pound; verdigrease finely powdered one ounce: melt the ingredients together, but do not put in the verdigrease, till removed from the fire; and it should be stirred in by degrees, till the whole is grown stiff and cool.

If the fever and inflammation run high, and the swelling be so situated as to endanger suffocation, a moderate quantity of blood must be taken away, and the remainder diluted with plenty of water gruel, or warm water, mashes, &c.

The running at the nose, which often attends the strangles, is dangerous; especially if it continues after they have ripened and broke, as the horse will be greatly weakened thereby. To prevent this waste and decay, give him every day for some time an ounce of Jesuits bark; or a strong decoction of guaiacum shavings, which has been found extremely beneficial in restraining these glandular discharges when too liberal, and in drying up ulcers of all kinds in horses. *See the article* GLANDERS.

If a hardness remains after the sores are healed up, they may be anointed with the mercurial ointment; and when the horse has recovered his strength, purging will be necessary.

STRANGURY, a disease incident to cattle, consisting in a difficulty of making urine, attended with great pain. *See the article* KIDNEY.

STRAW, the stalk on which corn grows, and from which it is thrashed. *See the articles* DUNG *and* RICK.

STRAWBERRY-TREFOIL. *See the article* TREFOIL.

STRICKLE, the whet-stone placed upon the extremity of the shaft of a scythe.

STRIKE, a bushel, or four pecks of corn.

STRINGHALT, a disease in horses, consisting in a twitching and snatching up of the hinder leg much higher than the other.

STUBBLE, the stalks of corn left in the field by the reaper.

It has been a dispute among farmers, whether wheat-stubble should or should not be ploughed in. We shall therefore give the following remarks of a sensible vale-farmer on this subject.

"We are far from being advocates, says he, for plowing in stubble; yet our land is not light, but the contrary, and bears as good crops of wheat as any in the kingdom.

"As our soil is not light, it agrees very well with horse-beans, which we frequently sow after wheat; but if ever we let the stubble remain uncut till bean season, and plow it in, the consequences are surely fatal; it causes the earth to lie hollow; the bean plants to fall down; the sun and air get at the roots, and prevent the plant thriving; and the crop is always very greatly lessened: besides, the stubble, which with us is very strong, clogs the plough-share, and gathers up in clods, which are a sure and a fatal shelter for many noxious insects.

"These facts, which every vale-farmer is well acquainted with, induce us always to mow our stubbles, which we apply to many and various uses: if it is long, it serves very well for thatching: we litter our yards, stables, and cow-houses with it for making dung; we use it for drying malt; and a great deal is burnt by the poor cottagers, for warming themselves in winter, dressing their victuals, baking, brewing, &c." *Museum Rusticum, vol.* III. *p.* 225.

STUM, the unfermented juice of the grape, after it has been several times racked off, and separated from its sediment.

STUMP, the part of any solid body, particularly of trees, &c. remaining after the rest are taken away.

A bare view of Fig. 6. Plate XXIV. is sufficient to explain a very simple engine which Mr. Evelyn gives, for pulling up large roots.

The handle *A* turns the pinion of the spindle *B*, which has four or five teeth. These teeth turn the larger wheel *C*, which moves the cylinder *D*, on which the rope *E* is rolled as the root is drawn up; one end of the rope being previously fastened to the cylinder. The whole frame is let into a block of wood *F*, about four feet high and one in breadth; and the other end of the roller or cylinder is sustained by a lesser block of wood *G*. *H* is an iron plate which holds the wheel and pinion in the larger block. The cylinder, wheel, pinion, and handle of this machine should be made of good tough iron. The cylinder may be about four inches in diameter, and fourteen or sixteen inches in length. The rest is obvious: though I apprehend an improvement might be made, by adding a catch to secure either the handle or the cylinder, while the labourer (for one man will easily manage this engine) may be obliged to suspend his work, in order to clear away any obstacle that may have occurred. It would likewise certainly be right to place the wheels, and consequently the handle, somewhat higher than is here directed, to save the very great fatigue of stooping down continually while this last is turned.

Where the roots are very large, and obstinately tenacious, M. de Turbilly's advice, to blow them up with gunpowder, will be found very beneficial; especially if the above instrument cannot be had.

Where a place has been over-grown with wood, the earth is so thoroughly stirred by digging and pulling up the stumps and roots of the trees, that one plowing in autumn is generally sufficient. The frosts in winter kill the weeds and break the clods; and after a second ploughing in the spring, these lands may be sown with expectation of an abundant crop: for the trees not having exhausted the earth towards the surface, but having on the contrary manured it with their leaves, a considerable produce may be expected for many years.

M. Du Hamel mentions a small field, which had formerly been underwood, and being converted into arable ground, produced plentiful crops of wheat and oats for upwards of twenty years running, without being rested. It is true the soil was peculiarly proper for wheat, and would have been exhausted much sooner if it had been a poorer earth.

STUMPY, full of stumps; hard, stiff.

STURK, a young bullock; a heifer.

STY, a cabin, or small building to keep hogs in.

SUCCULENT, juicy, moist.

SUCKER, a young twig, or ſhoot from the root.

SUFFOLK-GRASS, the ſame with meadow-graſs or poa. *See* POA.

SULLAGE, a drain of filth.

SULL, a plough. *See the article* PLOUGH.

SULL-PADDLE, a plough-paddle.

SUMMER, the ſeaſon in which the ſun arrives at the northern ſolſtice, and the days are at the greateſt length.

SUMMER, alſo implies the large piece of timber, or principal beam of a floor.

To SUMMER-LAND, or *To* SUMMER-STIR, to fallow land in the ſummer.

SUN-SCORCHED, a term uſed in ſome parts of England to expreſs a diſtemperature of fruit-trees, owing to the ſun's affecting them too forcibly on a ſudden; the conſequence of which is the loſs and withering of the fruit. Such trees are only ſubject to this, as are planted in places ſheltered from the ſpring-ſun, and open to that of the ſummer; and may be always cured by proper waterings.

SURBATING, a term uſed by farriers to ſignify the ſole of a horſe's foot being worn, bruiſed, or ſpoiled by beating the hoof againſt the ground in travelling without ſhoes, or going in hot ſandy lands, or with a ſhoe that hurts the ſole, or the like. It alſo ſometimes happens by over-riding a horſe while young, before his feet are ſufficiently hardened, or even by the hardneſs of the ground, and high lifting of his feet. The ſigns of this defect are his halting on both fore-legs, going ſtiffly, and creeping as if foundered.

There is nothing better for ſurbated feet than tar melted into the foot, or vinegar, boiled with ſoot to a proper conſiſtence and poured into the foot boiling hot, with hurds over it, and ſplints to keep it in.

SURFEIT, a diſeaſe incident to horſes and other cattle.

Surfeits ariſe from various cauſes; but are commonly the effects of ſome diſeaſes not attended to, or that have been ill cured.

A horſe is ſaid to be ſurfeited, when his coat ſtares, and looks ruſty and dirty, though proper means has not been wanting to keep him clean. The ſkin is full of ſcales and dander, that lay thick and mealy among the hair, and is conſtantly ſupplied with a freſh ſucceſſion of the ſame, for want of due tranſpiration. Some horſes have hurdles of various ſizes like peas or tares: ſome have dry fixed ſcabs all over their limbs and bodies; others a moiſture attended with heat and inflammation; the humours being ſo ſharp and violently itching, that the horſes rub ſo inceſſantly, as to make themſelves raw. Some have no eruptions at all, but an unwholſome look, and are dull, ſluggiſh, and lazy: ſome appear only lean and hide bound: others have flying pains and lameneſs, reſembling a rheumatiſm: ſo that in the ſurfeits of horſes, we have almoſt all the different ſpecies of the ſcurvy, and other chronical diſtempers.

The following method is uſually attended with ſucceſs in the dry ſpecies. Firſt take away about three or four pounds of blood; and then give the following mild purge, which will work as an alterative, and ſhould be repeated once a week, or ten days for ſome time.

> Take ſuccotrine aloes ſix drams, or one ounce; gum guaiacum half an ounce; diaphoretic antimony, and powder of myrrh, of each two drams: make into a ball with ſyrup of buckhorn.

In the intermediate days, an ounce of the following powder, ſhould be given morning and evening in his feeds.

> Take native cinnabar, or cinnabar of antimony, finely powdered, half a pound; crude antimony, in fine powder, four ounces; gum guaiacum, alſo in powder, four ounces: make into ſixteen doſes for eight days.

This medicine muſt be repeated till the horſe coats well, and all the ſymptoms of ſurfeit diſappear. If the horſe is of ſmall value, two or three common purges ſhould be given, and half an ounce of antimony, with the ſame quantity of ſulphur, twice a day, or the alterative balls with camphor and nitre.

If the little ſcabs on the ſkin do not peel off, anoint them with the mercurial ointment; during the time of uſing which, it will be proper to keep the horſe dry, and to give him warm water. This ointment properly rubbed into the blood, with the aſſiſtance of purging phyſic, has frequently cured theſe kind of ſurfeits, without any other aſſiſtance.

The wet ſurfeit, which is no more than a moiſt running ſcurvy, appears on different parts of the body of a horſe, attended ſometimes with great heat and inflammation; the neck oftentimes ſwells ſo in one night's time, that great quantities of a hot briny humour iſſues forth, which, if not allayed, will be apt to collect on the poll or withers, and produce the poll-evil or fiſtula. This diſeaſe alſo frequently attacks the limbs, where it proves obſtinate, and hard to cure: and in ſome horſes ſhews itſelf ſpring and fall.

In this caſe bleed plentifully, avoid externally all repellers, and give cooling phyſic twice a week; as, four ounces of lenetive electuary, with the ſame quantity of cream of tartar; or the latter, with four ounces of Glauber ſalts, quickened, if thought proper, with two or three drams of powder of jallap, diſſolved in water-gruel, and given in a morning faſting.

After three or four of theſe purges, two ounces of nitre made into a ball with honey, may be given every morning for a fortnight; and if attended with ſucceſs, repeated for a fortnight longer.

The powders above-mentioned may alſo be given with the horſe's corn; or a ſtrong decoction of guaiacum ſhavings, or logwood may be given alone to the quantity of two quarts a day. Theſe, and indeed all alterative medicines muſt be continued for a long time, where the diſorder proves obſtinate.

The diet ſhould be cool and opening, as ſcalded bran or barley; and if the horſe is hide-bound, an ounce of fenugreek ſeeds ſhould be given in his feeds for a month or longer; and as this diſorder often proceeds from worms, give the mercurial phyſic too, and afterwards the cinnabar powders, as above directed; but as in general it is not an original diſeaſe, but a ſymptom only of many, in the cure, regard muſt be had to the firſt cauſe: thus as it is an attendant on ſurfeits, fevers, worms, &c. the removal of this complaint muſt be variouſly effected.

In a mangy horſe the ſkin is generally tawny, thick, and full of wrinkles, eſpecially about the mane; the loins and tail, and the little hair that remains in thoſe parts ſtands almoſt always ſtrait out or briſtly: the ears are commonly naked and without hair, the eye and eye-

brows

brows the ſame; and when it affects the limbs, it gives them the ſame aſpect; yet the ſkin is not raw, nor peels off, as in the hot inflamed ſurfeit.

Where this diſtemper is caught by infection, if taken in time it is very eaſily cured: and I would recommend a ſulphur ointment as moſt effectual for that purpoſe, rubbed in every day. To purify and cleanſe the blood, give antimony and ſulphur for ſome weeks after. There are a great variety of external remedies for this purpoſe, ſuch as train oil and gun powder, tobacco ſteeped in chamber lye, &c. Solleyſell recommends the following:

Take burnt allum and borax in fine powder, of each two ounces; white vitriol and verdigreaſe powdered, of each four ounces; put them into a clean pot, with two pounds of honey, ſtirring till they are incorporated; when cold, add two ounces of ſtrong aqua fortis.

But when this diſorder is contracted by low feeding, and poverty of blood, the diet muſt be mended, and the horſe properly indulged with hay and corn. The following ointments are effectually uſed for this diſorder, rubbed into the parts affected every day.

Take powdered brimſtone, train oil, and tar, of each equal quantities: to which may be added ginger, or white hellebore.

Or,

Take ſulphur vivum, half a pound, crude ſal armoniac one ounce, hogs lard, or oil, a ſufficient quantity to form into an ointment.

Or,

Take quickſilver, and oil of vitriol, of each one ounce; hogs lard, one pound, ſulphur vivum four ounces, oil of turpentine one ounce and a half.

Theſe are both very powerful remedies for this diſorder, and can ſcarce fail of ſucceſs.

To the two firſt, occaſionally, may be added a third part of mercurial ointment; but as ſulphur is in general allowed, to be the ſpecefic in the itch, and being found both more ſafe, and efficacious than mercury, ſo we apprehend it will ſufficiently anſwer the purpoſe here; for as this diſorder ſeems beſt accounted for by Leuwenhoek, from certain ſmall inſects he diſcovered in the puſtules, by the microſcope, ſo it ſeems as if they were deſtroyed by the ſteams of brimſtone, though only raiſed by the heat of the body: for in the human body the itch may be cured by partial ſulphureous unctions, on the legs only; but where the mange proves obſtinate in horſes, let the parts be waſhed with ſublimate water before the application of the ointment, and ſubjoin the internal uſe of ſulphur, in order to diffuſe the ſteams more certainly through the ſkin; there being reaſon to believe, as in the itch, that the animalcula may ſometimes lie too deep to be thoroughly deſtroyed by external applications only.

SURVEYING, the art or act of meaſuring lands; that is, of taking the dimenſions of any field, parcel, or tract of land, laying down the ſame in a map or draught, and finding the content or area thereof.

As this art is of the utmoſt importance to all owners and occupiers of land, we ſhall endeavour to explain it in the eaſieſt and moſt intelligent manner. And in order to this we ſhall begin with the principles of the art, and proceed gradually to ſhew how all the ordinary figures may be meaſured, protracted, and caſt up, with no other inſtruments than chains, compaſſes and ſcales. We ſhall afterwards endeavour to explain, in a very eaſy and conciſe manner, the uſe of the plain table, and other inſtruments uſed in ſurveying; ſo that any perſon, of a common capacity, and that underſtands the four firſt rules of arithmetic, may be able to ſurvey and parcel out land, plot it, and give up its content with eaſe and expedition.

Of geometrical definitions, diviſions, and remarks.

I. A point is that which hath no parts, either of longitude or latitude, but is indiviſible, ordinarily expreſſed with a ſmall prick, like a period at the end of a ſentence.

II. A line hath length, but no breadth nor depth, whoſe limits or extremeties are points. This is either right or crooked.

III. A right line lies ſtreight, and equal between its extream points, being the ſhorteſt extenſion between them; the crooked or circular not ſo.

IV. A ſuperficies hath length and breadth, but no depth; of this, lines are the limits.

V. A plain ſuperficies is that which lieth equally (or evenly) between its lines.

VI. An angle is the meeting of two lines in one point, ſo as not to make one ſtreight line; and if drawn beyond that point, they will interſect or croſs one another. This in vulgar Engliſh may be called a corner; of which there be two ſorts, one right, the other oblique.

VII. A right angle is that which is made by two right lines, croſſing or touching one another perpendicularly, (or ſquarely) like an ordinary croſs, or carpenter's ſquare.

VIII. An oblique angle is that which is either greater or leſs than a right angle; and this is of two ſorts, obtuſe and acute.

IX. An obtuſe angle is greater than a right angle, like the left and right corners of a Roman X.

X. An acute angle is leſs than a right angle, like the higheſt and loweſt corners of the ſame letter.

XI. A figure is that which is comprehended under one line or many; of this there are two kinds, a circle, and a right-lined figure.

XII. A circle is a perfect round figure, ſuch as is drawn with a pair of compaſſes, the one foot being turned round in a point, and the other wheeled about it. The point in the preciſe middle is called the center; the round line, the circumference or periphery; a line going thro' the center, that divides the circle into two equal parts, is called the diameter; half of that line is a ſemi-diameter, or radius; half the circle is ſtiled a ſemi-circle; the quarter, a quadrant; any portion of it, cut off by a right line not touching the center, is called a ſegment.

XIII. Right-lined figures are ſuch as are limited by three right lines, or more, and are either triangles or trithree right lines, or more, and are either triangles or triangulate, that is, ſuch as are compounded of, and reſolvable into triangles.

XIV. Triangles are figures comprehended under three right lines, and (as Raſmus thinks that for a reaſon he gives lib.

Fig.1.

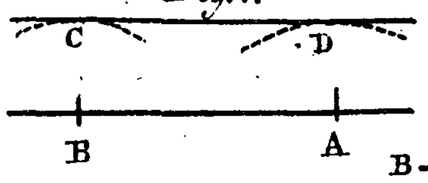


Fig.2.

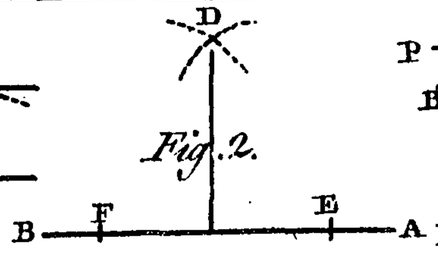


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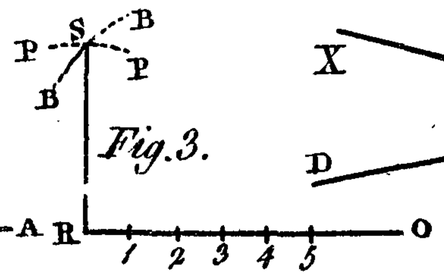
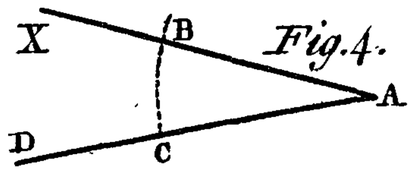


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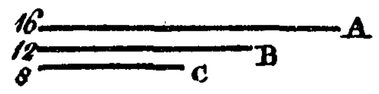


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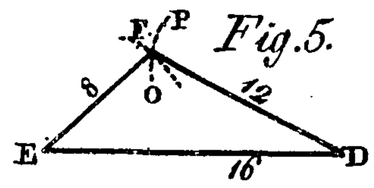


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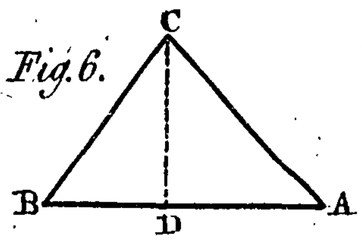


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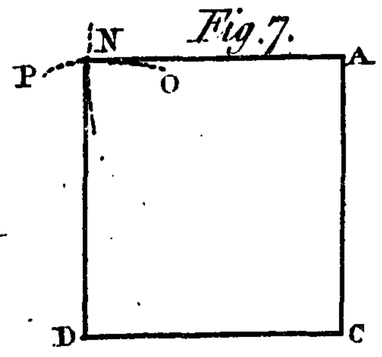
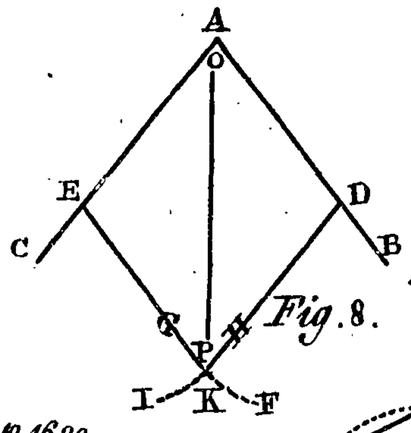


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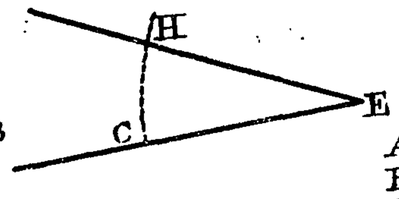


Fig.10.



Fig.9.

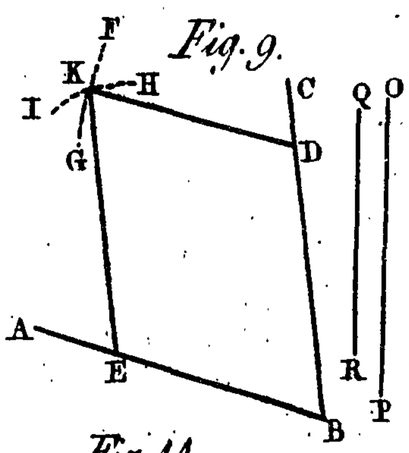


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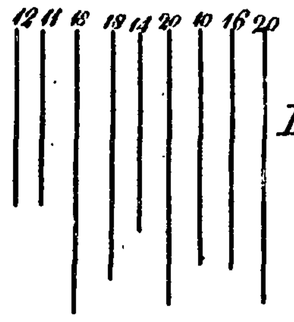
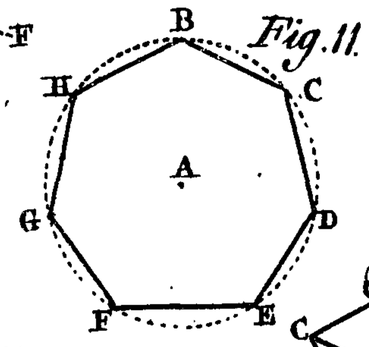


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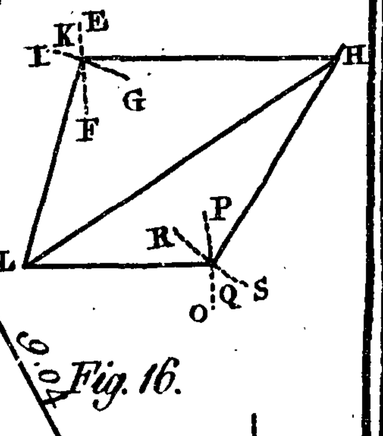


Fig.14

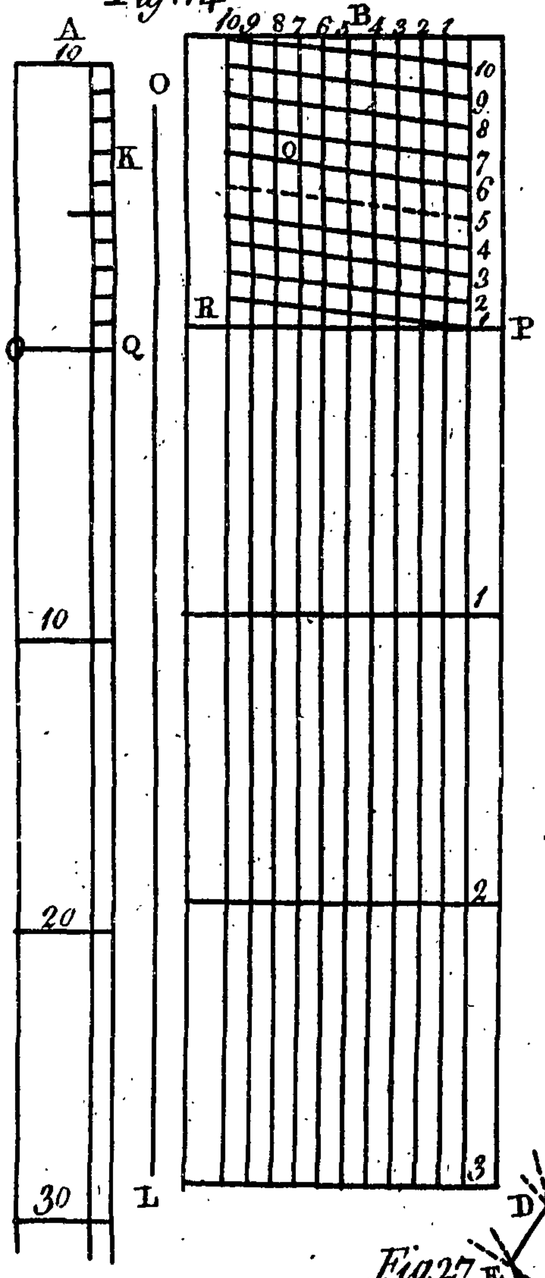
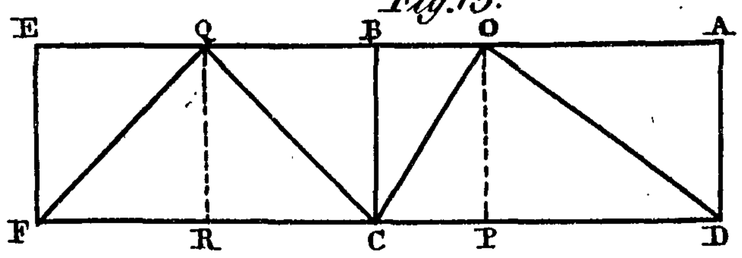


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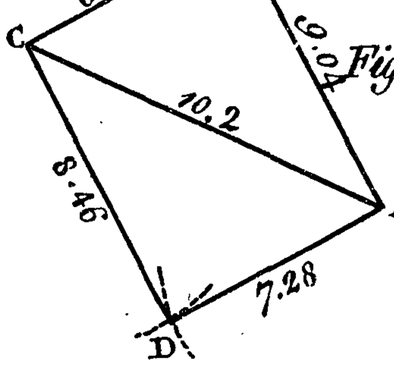


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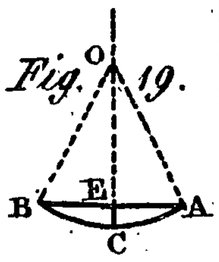


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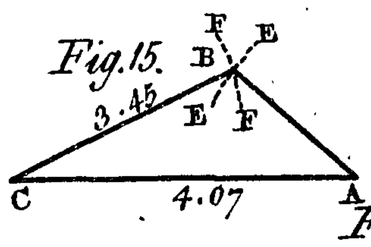


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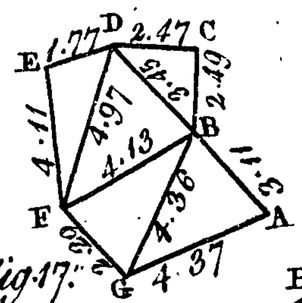


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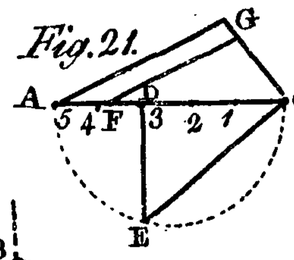


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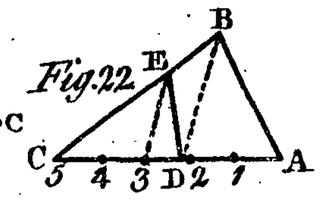


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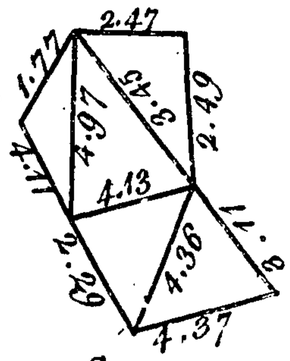


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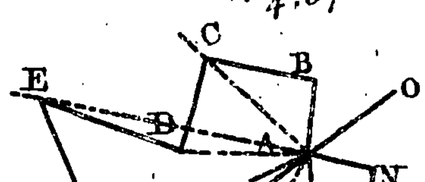


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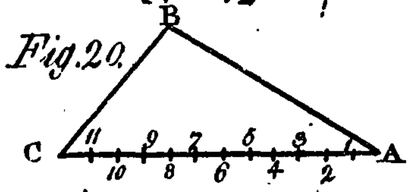


Fig.24



Fig.23.

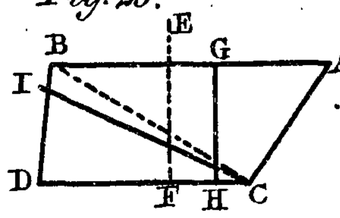


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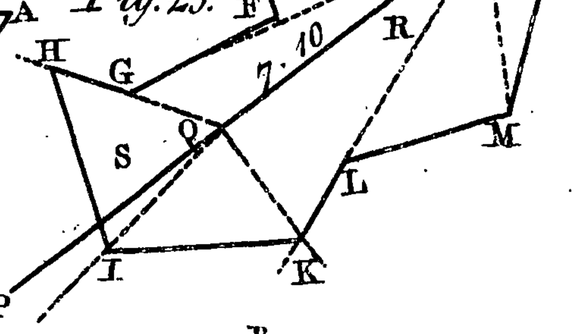


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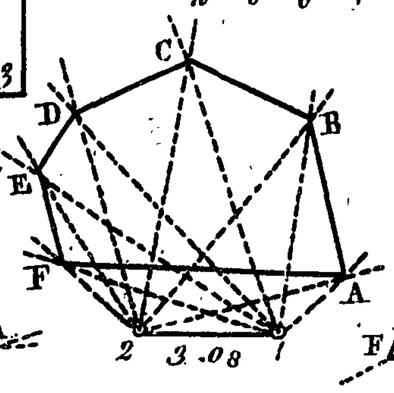


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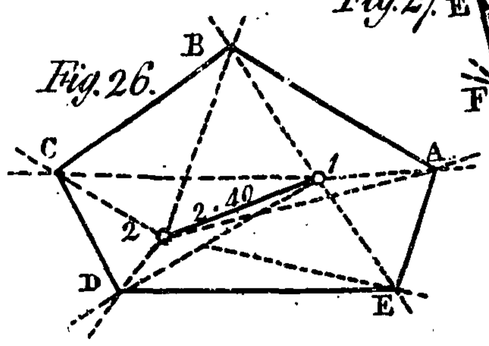


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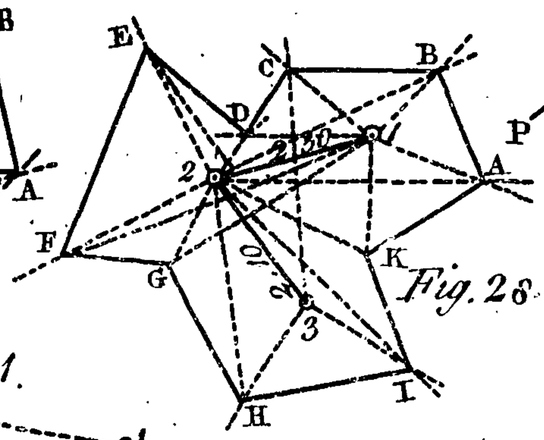


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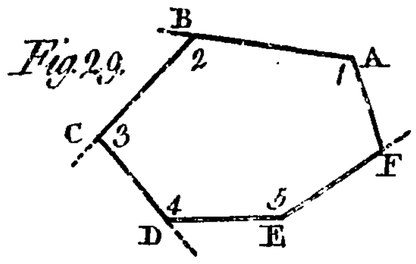


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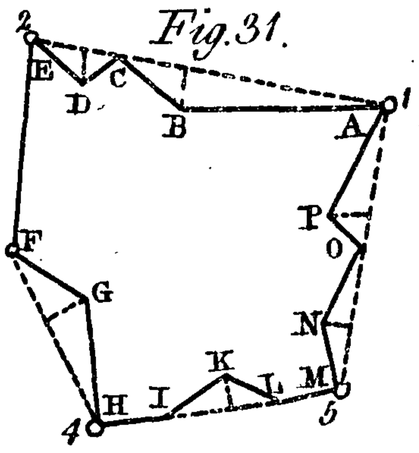


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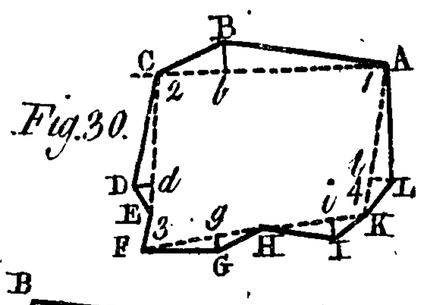


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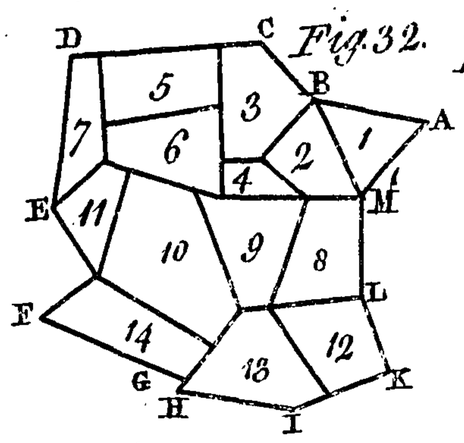


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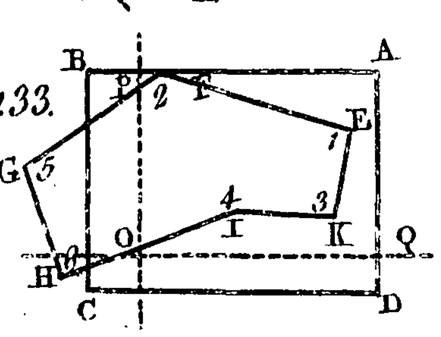


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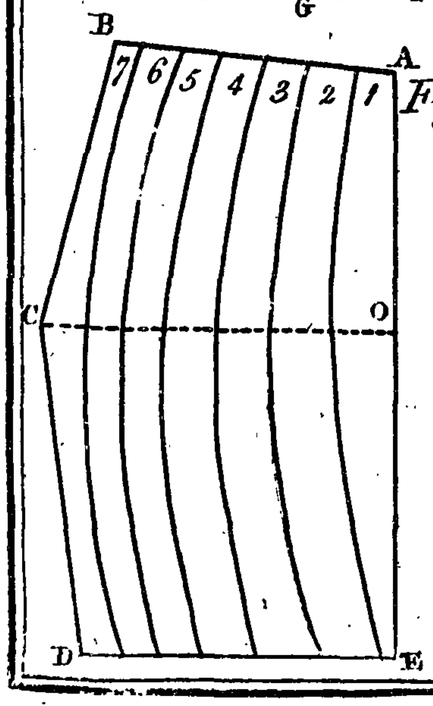


Fig.36

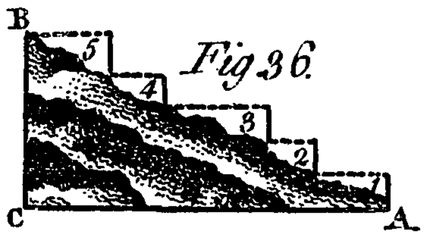


Fig.38.

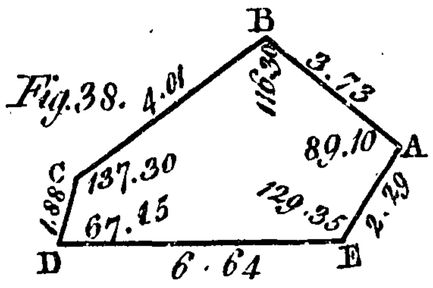


Fig.37.

Fig.39.

Fig.34.

lib. 6. pr. 6.) might be better called trilaterals; but the name triangle from the number of the angles hath obtained.

Alſo from the nature and quantity of their angles, theſe triangles are diſtinguiſhed into three ſorts, 1. Rect-angled, having one right angle. 2. Obtuſe-angled, having one obtuſe angle. And 3. Acute-angled, having all acute angles; for no triangle can have more right or obtuſe angles than one, becauſe by a well known old rule, no triangle upon a plain ſuperficies can conſiſt of three greater angles than ſuch, as being jointly taken, are equal to two right.

Theſe three ſorts of triangles may, according to the length and proportion of their ſides, be ſub-diſtinguiſhed into ſeven; for each of them may have either two equal ſides or none; and the acute-angled may have all three ſides or lines equal: but be triangles of what name or kind ſoever, they are all capable of being exactly meaſured by one plain rule, as hereafter ſhall fully appear.

XV. Triangular figures are ſuch as have more angles, and conſequently more ſides or lines, than three; and theſe are either quadrangular or multangular.

XVI. Quadrangular figures are ſuch as have four angles, and as many ſides, and theſe are either parallelograms or trapeſias.

XVII. Parallelograms are figures that are bounded with parallel lines, that is, ſuch lines as are every where of the ſame diſtance one from another, ſo as if they were infinitely extended, they would never meet, like the upright lines of the Roman H. Theſe parallelograms are either rect-angular or oblique angular.

XVIII. Rect-angular parallelograms are ſuch as have four right angles, viz. the ſquare or quadrat, and the long ſquare, otherwiſe called the oblong.

XIX. The ſquare is that figure that hath four right angles, and four equal ſides, like any of the ſix faces of a die.

XX. The long ſquare hath alſo four right angles, and the oppoſite ſides are equal, but the adjoining ſides meeting at each angle, differ in length. Of this figure is a well printed page in a book, and the ſuperficies of a well cut ſheet of paper, or an ordinary pane of glaſs.

XXI. Oblique angled parallelograms are ſuch as have oblique angles, viz. two acute, and two obtuſe, of theſe there are two kinds, the rhombus, and the rhomboides.

XXII. The rhombus is a figure that hath equal ſides, but no right angles, like the form of a diamond on the cards, or the moſt ordinary cut of glaſs in windows, whoſe oppoſite angles are equal.

XXIII. The rhomboides is a defective rhombus; for if from any ſide of a rhombus we cut off a part with a parallel line, the remainder will be a rhomboides, which hath neither equal ſides nor angles, but yet the oppoſite ſides and angles are equal.

XXIV. The trapezium is a figure that is neither parallelogram, nor conſequently, hath equal ſides or angles, but is irregularly quadrangular, as if drawn at adventure. Of this ſhape moſt fields prove, that ſeem to the eye to be ſquares or oblongs.

XXV. Multangular figures are ſuch as contain more ſides and angles than four, and they are either regular or irregular.

XXVI. Regular multangulars take their names from their number of angles, ſo a pentagon, hexagon, heptagon, octagon, eucagon, decagon, ſignify multangular figures of five, ſix, ſeven, eight, nine, ten angles, and conſequently ſides.

XXVII. An irregular polygon, or multangular figure, is that which hath more angles, and ſides than four, the ſides, and angles, being unequal to one another.

Of geometrical problems.

I. *To draw a line parallel to another, at any diſtance aſſigned.*

Plate XXV. Fig. 1. Open your compaſſes to the diſtances given, and chuſing two points conveniently diſtant in the line given, as here at A and B, deſcribe the arches C and D, to whoſe convexity, if you apply a rule, the parallel line is eaſily drawn.

II. *To raiſe a perpendicular upon a line given, or to croſs that line at right angles in a point aſſigned.*

Fig. 2. Suppoſe the point C in the line A B were aſſigned for the perpendicular, open the compaſſes to a convenient diſtance, and mark out the two points E and F in the line A B, then opening them ſomewhat wider, you may, by ſetting one foot in E and F ſeverally, deſcribe the two arches cutting one another at the point D, from which, if you draw a line to the point C, the work is done for the raiſing of a perpendicular; but if you be to croſs the lines at right angles, you may continue the line from D thro' C at pleaſure.

But if the ſaid line A B had been given to be divided in the preciſe middle, by another line croſſing it at right angles, the way is to ſet one point of the compaſſes in A and B ſeverally, and having deſcribed two arches above the line interſecting one another at D, do the like below the line A B from the ſame points, and with the ſame extent of your compaſſes, then through the ſeveral interſections, a rule being laid upon them, a line may be drawn, cutting the given line exactly in the middle at right angles.

Note, That when one point of your compaſſes ſtands in A, you may make both the arches belonging to that center above and below the line; and then removing the compaſſes to B, you may croſs them both.

III. *To raiſe a perpendicular at the end of a line.*

Fig. 3. Let O R be the line given, then to raiſe a perpendicular at R, make five little equal diviſions, and taking four of them with your compaſſes, ſet one foot of your compaſſes in R, and with the other deſcribe the arch P P; then take the diſtance from R to 5, and placing one foot in 3, with the other deſcribe the arch B B, interſecting the former in the point S; then ſhall the line SR (being drawn by a ſtrait rule) be a perpendicular to the line O R.

IV. *To let fall a perpendicular upon a given line from any point aſſigned.*

Open your compaſſes ſo as one foot being ſet in the aſſigned point, the other may go clear over the line given, and thereby deſcribe an arch cutting the line at two points; then ſhall the half diſtance between thoſe two points be the point to which the perpendicular may be drawn from the point aſſigned. But if you think it too much pains to find the point of half diſtance by trial, you may help yourſelf by the ſecond problem: for if you deſcribe two arches interſecting one another on the farther ſide of the line from the aſſigned point, placing (to that purpoſe) the foot of

your compaſſes firſt in one of the interſections of the given line, and then in the other; you may by laying a rule upon the aſſigned point, and the interſection of the two arches, draw a perpendicular from the ſaid aſſigned point, cutting the given lines at right angles.

N. B. All theſe problems with regard to perpendiculars, aim at no greater matter, than what may be performed in a mechanical way with exactneſs enough by the help of a ſmall ſquare exactly made, for if you apply one leg of ſuch a ſquare to any line, ſo as the angle of the ſquare may touch the end of the ſaid line, or any other point where the perpendicular is to be raiſed, you may by the other leg draw the perpendicular. In the like manner to let fall a perpendicular from a point aſſigned, you need only to apply one leg of the ſquare to the line, ſo as the other may touch, at the ſame time, the aſſigned point, whence you may draw the perpendicular by that leg that toucheth the point.

If the handle of your ſquare be a little blunt, either thro' ill making or long uſing, you muſt allow for it when you apply it to a point in a line. And when you are drawing a perpendicular, you muſt ſtop before you reach the given line, and then by applying the leg of your ſquare to that part of the perpendicular already drawn, ſo as part of that leg may paſs clearly over the given line, you may draw the reſt of your perpendicular as exactly as if the angle had been true. This ſame method is to be taken when a line is to be croſſed by another drawn quite through it at right angels.

V. *An angle being given, to make another equal to it.*

Fig. 4. The angle X A D being given, and a line drawn at pleaſure, as is the loweſt from the point E, open your compaſſes to any convenient diſtance, and ſetting one foot in A, deſcribe the arch B C. Then with the ſame extent ſetting one foot in E, with the other deſcribe the arch C H, long enough to equal or exceed the other. Then taking the diſtance B C between the points of your compaſſes, ſet one in C, and with the other mark the point H in the arch C H, through which point H a line being drawn from the point E, will make an angle with the line E C, equal to the angle given.

Note, when we ſpeak of the quantity of angles, their equality or inequality, we never regard the length of the lines; for if you extend or contract them at pleaſure, the angle is ſtill the ſame. But that is the greateſt angle whoſe lines are fartheſt diſtant from one another at the ſame diſtance from the angular point, or the place where its lines meet.

VI. *Any three lines being given, (equal or unequal) ſo as no one of them be longer than the other two joined together, to make a triangle of them.*

Fig. 5. The lines A B C being given, ſet the line A from D to E; then with your compaſſes take the length of the line B, and ſetting one foot in D, deſcribe the arch P O. This being done, take with your compaſſes the length of the line C, and ſetting one foot in E, with the other croſs the former arch at F, from which interſection drawing lines by a rule to D E, the triangle is finiſhed.

Note, that if all the ſides, or two of them, be equal, the method is the ſame; but the labour leſs, becauſe we need not take the ſame leng h twice over with the compaſſes.

VII. *To find the perpendicular of the triangle, in order to the meaſuring of it.*

Fig. 6. Let the line A B be accounted the baſe, and from the angle C, let fall a perpendicular, as was taught Probl. 4. upon that line at D, which is ready for taking off with compaſſes, and meaſuring on a ſcale, of which hereafter in meaſuring the content of figures.

But if we have no occaſion to draw the perpendicular, but only to know the length of it, (as it moſt frequently falls out in meaſuring) no more is needful; but to ſet one foot of the compaſſes in the angular point C, and extend the other to the baſe A B, ſo as it may touch it, but not go beyond it; then have we the perpendicular between the points of the Compaſſes.

VIII. *One ſide being given, to make a ſquare.*

Fig, 7. The line C D being given, raiſe a perpendicular at C of the length, at leaſt, of the given line; then taking the line C D between the feet of your compaſſes, ſet it upon the perpendicular from the angular point C to A: with the ſame diſtance ſetting one foot in D, deſcribe the arch O P. Laſtly with the ſame diſtance, or extent, ſet one foot in A, and with the other deſcribe the arch croſſing the arch O P in N, from which interſection a line drawn by a rule to A, and another to D, finiſh the geometrical ſquare or quadrat A C D N.

IX. *To make a long ſquare, the length and breadth being given.*

This is ſo nearly like the former, that a particular figure is not neceſſary to explain it. Suppoſe each ſide of the ſquare in the laſt problem to conſiſt of 8 ſmall equal parts, and you were to make a long ſquare, whoſe length muſt be equal to a ſide thereof, viz. 8. and the breadth half ſo much: when you had drawn the line C D, for the length, and raiſed the perpendicular at C, you muſt take the ſhorter line given for the breadth, and ſet upon the perpendicular from C, upwards to a point, which for diſtinction we ſhall call the point E, imagining it ſo marked: with the ſame extent of the compaſſes deſcribe the arch, placing one foot in D. Laſtly, extending your compaſſes to the length of the line C D, ſet one foot in E, and with the other croſs the arch aforeſaid. Then a right line drawn from that interſection to E, and another from the ſame to D, complete the long ſquare.

X. *To make a rhombus, the ſide being given.*

Fig 8. If the angles be not limited, draw any oblique angle at pleaſure, either acute or obtuſe, as here the angle B A C, which is acute. Then let the line O P be the length of a ſide, which being taken with your compaſſes, ſet it from the angular point A, in both lines to D and E, in which two points, place a foot of your compaſſes ſucceſſively without altering them, viz. in D, to deſcribe the arch F G, and in E, to deſcribe the arch H I, croſſing one another in the point K, from which right lines drawn to D and E, finiſh the rhombus D A E K.

Note, If any angle be given together with the ſide, to limit the ſhape and content, begin with that, and proceed as before; for you muſt know, that to make a rhombus (or rhomboide) like to another for figure, or equal to it in

in content, it is not ſufficient to have the ſame ſides; for the more oblique the angles are, the farther will the rhombus differ from a ſquare, and the leſs will be the content. But you muſt have an angle given, or elſe a diagonal line, which is a right line paſſing through the rhombus from one oppoſite angle to another, and dividing the figure into two equal triangles. If the former, viz. an angle, be given, we have ſhewed what uſe is to made of it. If the latter, *i. e.* a diagonal, together with the length of the ſides, you may, by taking the length of your ſides with your compaſſes, and ſetting a foot in the ends of the diagonal line, make a triangle on the one ſide of the diagonal, by Probl. 6. and then another on the other ſide by the ſame problem, the diagonal being a common baſe to them both; and this will give the figure exactly.

XI. *To make a rhomboides, the ſides being given.*

Fig. 9. If neither angle nor diagonal be given, make any angle at adventure, as here A B C. Then ſuppoſing the lines given to be O P and Q R, ſet the length of the longer upon the line B C, from B to D, and the ſhorter on the line B A to E. Then with the compaſſes extended from B to E, ſet one foot in D, and deſcribe the arch F G. Likewiſe, with the compaſſes extended to the length of the line O P, ſetting one foot in E, with the other deſcribe the arch H I, interſecting the former arch at K; from which interſection lines drawn to D and E, finiſh the rhomboides.

XII. *To make a trapezium, the diagonal and lines in order being given.*

Fig. 10. Let the line H L be the diagonal of a trapezium whoſe ſides are the lines A B C D; the ſide A being counted the firſt, as that which takes it, being from the point H, and the reſt in the order as they are marked alphabetically.

Then with your compaſſes ſet to the length of the line A, place one foot in H, and with the other deſcribe the arch E F. Next taking the length of the line B, with the one foot of your compaſſes placed in L, with the other make the arch G I, interſecting the former at K; from which point of interſection, lines drawn to H and L, make the triangle H K L.

Then with the extent of the line C, ſet one of the feet of your compaſſes at L, and deſcribe the arch O P. Laſtly ſetting them to the length of the line D, and placing one foot of your compaſſes in H, with the other make the arch S R, interſecting the former at Q; ſo ſhall lines drawn from Q, to L and H, make up the triangle L Q H, and finiſh the trapezium H K L Q.

We could have been much briefer in this problem, by referring to the 6th; but this being of very great and frequent uſe, we deſired to be very plain.

XIII. *To make a regular polygon, otherwiſe called a regular multangular, or multilateral figure, conſiſting of many equal ſides and angles, viz. above four a piece.*

Being ſatisfied what ſhall be the diſtance between the center and every angle, with that diſtance deſcribe a circle, which being equally divided into as many parts as the figure muſt have angles (or ſides, for they are equal in number) and lines drawn from the points of diviſion within the circle from point to point, (ordinarily called chords) the polygon is finiſhed, as in this diagram.

Fig. 11. Suppoſe an heptagon, or multangular figure of ſeven ſides, and as many angles, be to be deſcribed, every angle being deſigned to be diſtant from the center A, ſeven eights, or three quarters and a half of an inch; with that diſtance deſcribe the circle B C D E F G H, which being divided into ſeven equal parts, and lines drawn from point to point, the heptagon B C D E F G H will be therein included.

We ſhall rather leave our reader to find out the points of diviſion by many trials, than to puzzle him with the geometrical way for finding out chords to that purpoſe.

XIV. *Having the ſides of the triangles whereof it conſiſteth, orderly given, to make an irregular multangular, or multilateral figure.*

This will be more fully handled hereafter, when I come to ſhew the method of drawing plots of ground. In the interim I will give you a ſpecimen of an irregular pentagon.

Fig. 12. Having the lines of three triangles given, lay down the greateſt of the firſt, viz. 20, from A to B for a baſe, and by Probl. 6, make a triangle of it, and the other lines 16 and 10, viz. the triangle A B O.

Secondly, You find by the number 20 over the firſt line of the ſecond triangle, that it is the common baſe to them both; and therefore, by the ſame Probl. 6, make the triangle A B P of the lines, 20, 14, 18.

Laſtly, finding the baſe of the third triangle to be the ſame with 18, one of the ſides of the ſecond make the triangle P B Q of the lines 18, 11, 12: ſo is the quintangular figure finiſhed.

How every line is to be found in its due order in this, or any other ſort of multangular figures, ſo as to give a true and exact account, not only of the ſuperficial content, but alſo of the figure and ſituation, is to be taught hereafter in the doctrine and practice of Protraction.

How to find the ſuperficial content of any right-lined figure, the lines being given.

As a foundation to what we ſhall ſay upon this ſubject, there are ſome few geometrical principles or theorems out of Euclid and Ramus, which we deſire may be remembered; and becauſe underſtanding is a great help to memory, we ſhall make uſe of a kind of ocular demonſtration; which though not ſo ſtrict and artificial as that which is to be found in the commentators upon Euclid in the quoted places, will be more ſerviceable becauſe more eaſily underſtood.

Theor. 1. *Every parallelogram being of the ſame length with the baſe of a triangle, and of the ſame height with the perpendicular of that triangle, is double to it.* Euclid 41. 1.

Fig. 13. Here are two equal oblongs, or long ſquares, A B C D and B E F C, and within them two triangles inſcribed, whoſe baſes are of the ſame length, and their perpendiculars, O P and Q R, of the ſame height with the oblongs. Now each of theſe triangles being parted into two right-angled triangles by their perpendiculars, then it is plain to the eye, and from the nature of diagonals, which ever divide a parallelogram into equal parts, that

the two new triangles OPD and OPC, which make up the firſt of the given triangles, are equal to the triangles DAO and OBC, which make up the remainder of the parallelogram A B C D. Therefore that parallelogram is double to that triangle, which was to be demonſtrated.

In like manner it is evident, that the parallelogram BEFC is double to the triangle C O F, becauſe C R Q is equal to B Q C, and Q R F is equal to Q E F.

Theor. 2. *All triangles having the ſame baſe, and lying between the ſame parallels, are equal.* Euclid 37. 1.

So in our laſt diagram, the two given triangles having baſes of the ſame length, and lying between the ſame parallels, are evidently equal, becauſe they are demonſtrated to contain each of them the exact half of the parallelograms, wherein they are inſcribed; and the parallelograms being equal, their halves muſt be equal alſo.

Theor. 3. *The ſides of the triangulate (that is, one that hath four or more ſides) are ever two more than the triangles of which it is made.* Ram. lib. 10. prop. 2.

Fig. 10, 12. This is plain by inſpection, if you view again the figures of the trapezium and irregular pentagon, in the 12th and 14th problems.

Theſe theorems being allowed to be true, the doctrine concerning the ſuperficial content of right-lined figures, might be reduced to a narrow compaſs; for he that knoweth how to huſband theſe three theorems, may eaſily take up theſe corollaries, *ordine inverſo*.

1. Any quadrangular figure, regular or irregular, may by a diagonal be parted into two triangles; any five-ſided figure by two diagonals into three triangles; and ſix-ſided figures into four by three diagonals, &c. by Theor. 3.

2. It is no matter of what ſhape the triangle is, as to the rule for meaſuring, for whether it be right-angled, acute-angled, or obtuſe-angled, and whether it have three, two, or no lines equal, it is only the length of the baſe, and height of the perpendicular, and is conſiderable by Theor. 2.

3. The true meaſure or content of any triangle, whether alone, or as part of any triangulate figure of 4, 5, 6, or more ſides, (and conſequently of the whole figure, by ſumming up the content of all the ſeveral triangles) is found by multiplying the whole baſe of the triangle by half the perpendicular, or the whole perpendicular by half the baſe; which being a rule of ſuch infinite uſe in ſurveying, we deſire it may be remembered; and that it may be underſtood, we ſhall give a plain example.

```
44   20
10   22
----  --
440  40
     40
    ---
    440
```

Fig. 6. Suppoſe A B the baſe of the triangle belonging to the 7th problem, to be 44, and the perpendicular C D to be 20: whether you multiply 44, the whole baſe by 10, the half of the perpendicular, or 20, the whole perpendicular by 22, the half baſe, the product gives the content 440, as is here apparent.

Having thus given a general method how all right-lined figures may be reduced to triangles, and ſo their contents found, we might paſs to the next head concerning inſtruments, and their uſe; but becauſe there are nearer ways in meaſuring particular kinds of triangulate figures proper to thoſe kinds, we ſhall briefly mention them.

I. *To find the contents of a ſquare, or long ſquare.*

Multiply the length by the breadth, the product gives the area or content.

Example of a ſquare.

```
 17 inches length.
 17 inches breadth.
----
119
 17
----
289 ſquare inches.
```

Example of an oblong.

```
 25 feet long.
 13 feet broad.
----
 75
 25
----
325 ſquare feet.
```

II. *To find the area or content in meaſure of a rhombus.*

Let fall a perpendicular from one of the obtuſe angles upon the oppoſite ſide; that ſide multiplied by the perpendicular, gives the area.

```
20 yards the ſide.
14 yards the perpendicular.
---
 80
 20
---
280 ſquare yards.
```

III. *To find the area of a rhomboides.*

Divide it into two triangles by a diagonal drawn between either pair of the oppoſite angles, then from either of the other angles let fall a perpendicular upon that diagonal, then ſhall that diagonal, being multiplied by that perpendicular, give the area.

Example.

```
19 rods the diagonal.
 5 rods the perpendicular.
---
95 ſquare rods the content.
---
```

IV. *To find the content of a trapezium.*

Fig. 10. Divide it by a diagonal into two parts from angle to angle, as the trapezium, Probl. 12. is divided by the diagonal H L, then from the other two angles, which in that figure are marked with K and Q, let fall perpendiculars upon the diagonal, half the ſum of thoſe perpendiculars being multiplied by the diagonal, or common baſe, gives the ſuperficial content.

Example.

Suppoſe in the trapezium before-mentioned the diagonal is 33, the perpendicular from K 13, and that from Q 15, the area or ſuperficial content is thus computed.

13 chains

13 chains the firſt perpendicular.
15 the ſecond perpendicular.

28 the ſum of both perpendiculars.

14 their half ſum.
33 the diagonal.

42
42

462 ſquare chains the area.

V. *To find the content of a regular polygonial, or multangular figure, otherwiſe called multilateral.*

Draw a line from the center to the middle of any ſide; half of the perimeter, or of all the ſides, being multiplied by that line before-mentioned, gives the content.

VI. *To find the content of an irregular polygon, or many-ſided figure.*

Divide it into trapezia and triangles by diagonals, then find their content ſeverally, and ſum up all together.

Fig. 12. Suppoſe the polygon belonging to the laſt problem were given without the diagonals AB and BP; then by drawing thoſe diagonals, the figure is divided into three triangles, whereof two being upon the ſame baſe A B, make up a trapezium, whoſe content may be found juſt in the ſame manner as was taught even now in the fourth rule, having found the perpendiculars from O and P falling upon the line A B. Then there remains the triangle BQP, whoſe content may be found by the general rule concerning triangles, having found the perpendicular falling from Q on the line B P; and then having added the content of that triangle to the content of the trapezium, you have the area of the whole polygonial figure.

Concerning chains, compaſſes, and ſcales.

I. Amongſt the many ſorts of chains uſed for meaſuring land, three are moſt famous, bearing the names of their inventors, Mr. Rathborne, Mr. Gunter, and Mr. Wing, all of them ingeniouſly divided, and uſeful in their kind; but brevity will give us leave only to deſcribe one, and that ſhall be Mr. Gunter's, being moſt in uſe, and eaſy to be procured.

This chain contains in length, four ſtatute-poles or perches, each perch containing 16 feet and a half, or 5 yards and a half; ſo that the whole chain is 66 feet, or 22 yards long.

The whole chain is divided into 100 equal parts or links, whereof 25 are a juſt pole or perch; and for ready counting, there is uſually a remarkable diſtinction by ſome plate or large ring at the end of every 25 links, but eſpecially at the preciſe middle of the chain, which ſhould differ from the reſt in greatneſs and conſpicuouſneſs. Alſo at the end of every tenth link, it is uſual to hang a ſmall curtain-ring; and if there be at every five links end a piece of wire made like the bow of a link, with a little ſhank an inch or leſs long, or ſome ſuch diſtinction, it is ſtill better.

When you are to meaſure any line by this chain, you need to regard no other denomination but only chains and links, ſet down with a prick of your pen between them. *e. g.* If you found the ſide of a cloſe to be 6 chains and 35 links long, it is thus to be put down, 6.35.

But if the links be under 10, a cypher muſt be prefixed; ſo 7 chains 9 links muſt be thus ſet, 7.09.

In the uſing of this, or indeed of any chain, care muſt be taken both to go ſtrait, and to keep a true account; for which purpoſe, it is good that he who goeth before, carry in his hand a bundle of rods, to ſtick down one at the end of the chain which leads, having firſt ſtretched it well, and that he who follows do not only gather up the rods to keep the account, but alſo at every remove, mark whether he ſees the leader directly between his eye and the angle, or other mark he aims to meaſure to; and if need be, call to the leader to move towards the right or left hand, till he ſee him in a direct line to it.

II. Compaſſes are ſo well known, that we need not deſcribe them; only they ſhould be of braſs, with ſteel points, ſmall and neatly wrought, nine or ten inches long from the joint to the points, turning ſo truly upon the rivet, that they may be eaſily opened, and yet ſtand ſo firmly, that an arch or circle may be, without their ſhrinking, deſcribed upon a large radius.

III. Scales are certain lines divided into equal parts, upon plates or broad rules of braſs or box, and they are of two ſorts, 1. Plain. 2. Diagonal.

1. Plain ſcales are made up of two ſmall lines parallel to one another at a little diſtance, and theſe are divided into great equal parts, which ſignify tens, and are noted 10, 20, 30, 40, 50, &c. according to the length of the lines.

They may be of any convenient length, but theſe great diviſions are ſeldom more than inches, or leſs than third parts a piece.

Again, one of the great diviſions is ſubdivided into ten equal parts by ſhort lines, whereof that in the middle ſtanding for 5, is longer than the reſt.

Fig. 13. According to the numbers of theſe little parts contained in an inch, the ſcale is named, A, ſcale of 10, 11, 12, 16, 20, 24, 30, &c. in an inch. That ſhort one which we give you the figure of A, is of 10 in an inch, ſo noted at the top, according as is uſual upon the rules, and indexes of plain tables. The line marked O Q, ſeparates units and tens; units being taken upward from that line, and tens downward; mixt numbers both ways.

As for example.

7 Is the extent of the compaſſes upon the ſcale A, from the line O Q to K; 30 is their extent from the line ſo marked to O Q; and 27 is their extent from the line 20, to the ſhort line K aforeſaid.

Here note, that you muſt not expect to find the letters O Q or K upon the ſcales which you buy, being only marks uſed at pleaſure, to make our meaning plain; and likewiſe that this ſcale of 10 in an inch, and others that are ſmaller are uſually made, for more convenient uſe, ſo long as to contain nine or ten of the great diviſions, ſignifying tens; though the figure at A being deſigned for no other uſe than to help our conceptions, extends but a little beyond 30, that length being ſufficient for my purpoſe in this place.

Fig. 14. Theſe plain ſcales, eſpecially the ſmaller ſorts of them, ſuch as 24 or 30 in an inch, are very proper for drawing figures upon paper where the numbers repreſented

ſented by the lines are not above 100, for then every diviſion may be counted as it is upon the ſcale, or above upon a long ſcale.

Alſo in the ſurveying of foreſts, chaſes, and great commons, where the lines are vaſtly long, and the miſtake of a few lines is not conſiderable, they may be conveniently uſed, accounting the tens and units to ſignify ſo many whole chains, and ſo eſtimating the parts of a chain with the compaſſes upon the ſmall diviſions, which a ſagacious man may do very near upon one of the larger ſcales. But it would be much better for ordinary meaſuring, if the grand diviſions of the ſcale were two inches apiece, for then the ſmaller diviſions being of five in an inch, would be ſo large as to be ſub-divided into five a-piece, which repreſents 20 links; and then the half one of thoſe ſmaller diviſions ſignifying 10 links, and the quarter 5, a very ordinary judgment may come very near to the truth by eſtimation.

2. But the diagonal ſcale is ſo well known to every mathematical inſtrument-maker, ſo eaſy to be procured, and every way ſo fitted to Gunter's chain, that we cannot but highly commend it.

It is made, as appears by the figure B, upon eleven parallel lines equidiſtant, ſo as to include ten equal ſpaces, which are all cut at right angles by tranſverſe lines dividing them all into four equal parts.

One of theſe tranſverſe lines, viz. P R, where it toucheth the firſt and laſt lines, ſeparates between the hundreds, or whole chains, and the tens repreſenting 10 links apiece, the chains being numbered downwards on the left hand from P only to 3, but on the inſtrument itſelf they may go on to 9 or 10, but the tens upward from P to 10.

From the points of diviſion into tens upon the firſt line, beginning at P, to the like points beginning at R in the laſt line are nine diagonal lines drawn, the firſt beginning at P, and ending at the firſt diviſion above R. The ſecond beginning at the firſt diviſion above P, and ending at the ſecond above R. In a word, they are all drawn from one diviſion leſs from P, to one more from R; by which it comes to paſs that every diagonal, by that time it hath paſſed from the firſt line to the eleventh, is a whole tenth part of an inch, which anſwers to ten links of the chain, farther diſtant from the line P R than at the points upon the firſt line whence it was drawn.

Every one of thoſe diagonals is divided into ten equal parts by the long parallel lines running through the whole ſcale, and numbered on the top from 1 to 9. Whereby it is evident that the interſection of any of the nine parallel lines that are numbered at the head with any diagonal, muſt be farther diſtant from the line P R, than the interſection of the line next before it with the ſame diagonal by $\frac{1}{10}$ of $\frac{1}{10}$, that is, by $\frac{1}{100}$, which anſwereth to a ſingle link of your chain.

From what has been ſaid, and inſpection of the figure B, theſe things plainly follow; which, as ſo many clear inſtances, will help you to underſtand it fully.

The diſtance from P R, to the ſecond diviſion below it, anſwereth to two chains.

The diſtance from P R to the eighth diviſion upward, being taken (with compaſſes) upon the firſt line of the eleven from P to 8, anſwereth to 80 links.

Conſequently the extent of the compaſſes from the ſecond grand diviſion below P, to the eighth of the leſs diviſions upward, is proportionable to 2 chains 80 links.

The diſtance from P R to the firſt diagonal being taken upon the parallel line, noted with 9 above, anſwereth to 9 links: where note, that the firſt diagonal is not that which is noted with 1, but that which is drawn from the point P.

The diſtance upon the ſame line from P R to the diagonal that is marked with 7, is anſwerable to 79 links.

The extent of the compaſſes from the bottom of the figure upon the ſame line to the ſame diagonal, anſwereth to 3 chains 79 links.

In ſhort, whole chains may be meaſured upon any line from P R, to the grand diviſion noted with the given number, decads alone, or chains and decads upon the firſt line of the eleven where the diagonals begin. Links alone, decads with links, and chains and decads with links, always upon that line upon which the number of the odd links ſtands at the head of the ſcale.

N. B. Theſe directions will as well fit, if half an inch be only allowed for a chain, and conſequently all the diagonals drawn within that extent, as is uſual upon the other end of the ſame rule, the grand diviſion for chains going the contrary way, and noted with numeral figures in order. It is therefore proper when you furniſh yourſelf with ſcales, to have diagonal ſcales of both dimenſions on the fore-ſide of your rule, and upon the back ſide many plain ſcales of equal parts, with a line of chords.

How to caſt up the content of a figure, the lines being given in chains and links.

Having deſcribed theſe plain inſtruments, and in ſome meaſure ſhewed the uſe of them in ſeveral inſtances, it were very proper in the next place to teach their joint uſe in meaſuring and protracting; but becauſe we would have our young ſurveyor, before we take him into the field, able to perform his whole work together, we intend to ſhew him,

1. How he ought to make his computations; 2. The grounds or principles that will juſtify him in ſo doing.

For the firſt, take theſe rules:

1. Put down your length and breadth of ſquares and oblongs, and your baſe and half perpendicular of triangles directly under one another, expreſſed by chains and links with a prick betwixt them, as was taught before.

2. If the odd links were under ten, put a cypher before the numeral figure expreſſing them, (as there alſo was ſhewed) and if there be no odd links, but all even chains, put two cyphers after the prick.

3. Multiply length by breadth, and baſe by the half perpendicular, according to the rules for finding the content of figures.

4. From their product cut off five figures, accounting cyphers alſo for ſuch, reckoned from the right-hand backward, with a daſh of your pen, ſo ſhall thoſe to the left hand ſignify acres.

5. If thoſe five cut off were not all cyphers, multiply them by four, and cutting off five towards the right hand again, the reſt will be roods or quarters.

6. If amongſt theſe five figures towards the right hand that were cut off at the ſecond multiplication, there be any figures beſides cyphers, multiply all the five by forty, and cutting off five again by a daſh of your pen,

pen, thoſe on the left hand ſignify ſquare perches, poles or roods.

A few examples will make all plain.

Queſt. 1. *What is the content of a ſquare, whoſe ſides are every one of them 7 chains, 25 links?*

Length 7. 25.
Breadth 7. 25.

3625
1450
5075

5|25625
4

1|02500
40

1|00000

Anſ. 5 acres, 1 rood, and 1 perch, as here appears.

Queſt. 2. *In a long ſquare whoſe length is 14 chains, and the breadth 6 chains 5 links, what is contained?*

Length 14.00
Breadth 6.05

7000
84000

8|47000
4

1|88000
40

35|20008

Anſw. 8 acres, 1 rood, and 35 perches, as the work makes it evident.

Queſt. 3. *In a triangle, whoſe baſe is 3 chains, and half the perpendicular 98 links, what is the content?*

The baſe 3.00
Half perpend. 0.98

2400
2700

|29400
4

1|17600
40

7|04000

Anſw. 0 acres, 1 rood, 7 perches.

There are other ways of computation by ſcales, tables, &c. But that this is demonſtrative, will appear by the following ſteps.

1. It is evident, that in this way of multiplication, the product is ſquare links; for every chain being 100 links, it is all one to multiply 7.25 by 7.25, or 725 by 725 without pricks; for the pricks ſignify ſomething as to conceptions, but nothing at all in operation. The product therefore of the firſt example was really 525625 links.

2. Every chain being 4 perches long, it follows that 5 chains, or 20 perches in length, and 2 chains, or 8 perches in breadth, make an acre, or 160 ſquare perches; for 20 being multiplied by 8, gives 160.

3. From hence it plainly follows that there are exactly 100000 ſquare links in an acre; for 5 chains multiplied by 2, is the ſame with 500 links by 200, which makes 100000. And he does not deſerve the name of an arithmetician, that is ignorant of this old plain rule, when the diviſor conſiſts of 1 and cyphers, as 10, 100, 1000, 10000, 100000, &c. cut off from the right hand ſo many figures of the dividend as the diviſor hath cyphers, accounting them the remainder; ſo ſhall the reſt on the left ſide be the quotient. It is plain then that 525625 ſquare links, make 5 acres, and 25625 ſquare links over.

Thus we have made it clear to a very ordinary capacity, that as far as concern acres, the rules for computation are good. Now for roods and perches, though it might be ſufficient to mention that known rule in decimal arithmetic, multiplying decimal fractions by known parts, gives thoſe known parts in integers, due regard being had to the ſeparation, we ſhall proceed thus: if 25625 ſquare links, which remain above an acre, contain any quarter or quarters of an acre, then, if they be multiplied by 4, and divided by 100000, that is, five cut off from the product, they will contain ſo many acres as now they do quarters, or roods, for any number of quarters multiplied by 4, muſt needs produce the like number of units or integers, and the diviſion only reduces them into the right denomination. Now, 25625 being multiplied by 4, and five figures being cut off from the product, the reſult is, 1|02500, that is an acre and above; which ſhews it was above a quarter before it was multiplied by 4.

And to find how much, that is, how many ſquare perches are contained in this laſt remainder, you muſt conſider this 2500, not as ſquare links remaining above the rood or quarter, but as four parts or quarters of ſquare links, or, which is all one, as the true number of ſquare links multiplied by 4, and conſequently being multiplied by 40, the fourth part of ſquare perches in an acre, it muſt as often contain 100000 ſquare links, or an acre, as the quarter of this number 2500, viz. 625, ſignifying ſquare links, containing ſquare perches; and ſo for 100000 divided by 160, the number of perches in an acre, gives 625, anſwering to one perch; and 2500 multiplied by 40, gives 100000, or one acre, the five cyphers being cut off.

2500 160 100|000625
40 960

1|00000 400
320

800
800

How

How to meaſure a cloſe, or parcel of land, and to protract it, and give up the content.

Hitherto we have been like children learning to ſpell, now let us ſet our ſyllables together: that is, let us make uſe of the inſtructions before given to meaſure a piece of land, to plot it, and to caſt up the content.

All cloſes, or parcels of land, are either ſuch as need not be plotted for finding their true meaſure, but the chain alone doth the work; or ſuch as cannot be conveniently meaſured without plotting or protraction.

Of the firſt ſort are the ſquare and long ſquare, known before-hand to be ſuch, or found ſo to be by ſuch inſtruments as are not yet deſcribed, or by meaſuring all the ſides and diagonals. Theſe ſquares and long ſquares need no protracting; for you need only to multiply the chains and links of the length by the chains and links of the breadth, and ſo proceed as in the firſt and ſecond examples: but all others, whether triangles or triangulate, are to be protracted. We ſhall give examples therefore in the three ſorts of figures, triangular, quadrangular, and multangular.

But before we proceed to particular inſtances, let the young practitioner remember,

1. To begin at ſome notable angle of the field where there is ſome houſe, gate, ſtile, well, or the like; or if there be none, then to dig up a clod, drive down a ſtake, or at leaſt, to obſerve what quarter of the heavens it pointeth towards, whether eaſt, weſt, north, or ſouth, and on your paper mark it with the letter A, or any other.

2. To go parallel to the ſide of the field, if pits, buſhes, or the like, hinder not, and if they do, to allow for it, accuſtoming yourſelf to go either with your left hand towards the hedges, walls, or pales; or with your right hand towards them: and when you go contrary to your uſual cuſtom, note it on your paper by ſome mark known to yourſelf.

3. To ſet down the chains and links of every ſide as you meaſure them, and truſt not your memory. A black lead pencil will be very proper for this purpoſe.

4. To take care, if you have more ſcales than one upon your rule, leſt you confound yourſelf by taking lines off of ſeveral ſcales, or meaſuring perpendiculars upon wrong ones; for every line of the ſame figure muſt be made by the ſame ſcale, and the perpendiculars meaſured by it.

5. To make uſe of a ſcale of larger diviſions when you meaſure ſmall cloſes, and of ſmaller when you meaſure great ones.

6. To make your lines and points where angles meet, ſmall, pure, and neat.

7. To ſet on your chains and links at twice, when any line is too long for your ſcale.

Theſe things being premiſed, proceed thus:

I. Suppoſe a triangular field is to be meaſured with the chain, beginning at the eaſtern angle A, Fig. 15, and find the ſides in their order and meaſure to be ſeverally thus; 2.29, 3.45, 4.07.

Making uſe of the leſs diagonal ſcale, becauſe the other would make the figure too large, otherwiſe it were more proper for ſo ſmall a cloſe, with your compaſſes to take off the ſcale 4 chains and 7 links, and ſetting them from A to C, draw that line for the baſe, becauſe the longeſt of the three; than take 2 chains 29 links off the ſame ſcale, and ſet them in the eaſtern point A, and turning the looſe foot of the compaſſes above the line A C, deſcribe, at that diſtance 2.29, the arch E E.

Next taking with your compaſſes upon the ſame ſcale the extent of 3 chains 45 links, place one foot in the point C, and with the other make the arch F F, interſecting the former in the point B; and drawing the lines A B and B C, the triangle A B C is the plot of the triangular field meaſured.

But before you can give the content, you muſt find the length of the perpendicular, which is done by ſetting one foot of the compaſſes in B, and extending the other to the baſe A C, ſo as to touch it, and paſs not over it, for then the length of the perpendicular is between the points of the compaſſes, and being applied to the ſame ſcale by which the triangle A B C was made, it appears to be 1 chain 42 links. With the half whereof multiply 4.07, the length of the baſe, the content appears to be 0 acres, 1 rood, 6 perches.

The baſe	4.07
Half perpend.	0.71
	407
	2849
	28897
	4
	1|15588
	40
	6|23520

II. Suppoſe you are to meaſure a quadrangular or four-cornered field, begin as before at ſome remarkable angle; and going round the cloſe, find the ſides to be 9.04, 6.72, 8.46, 7.28, and the diagonal from that remarkable angle to the oppoſite angle to be 10.02; we begin to protract it thus:

Fig. 16. Having by the help of your ſcale and compaſſes drawn the diagonal 10.02, from the remarkable angle A to C, the oppoſite angle, make a triangle of it, and the firſt and ſecond ſides 9.04 and 6.72, and another after the ſame method of that diagonal, and the third and fourth ſides 8.46 and 7.28, ſo you have the trapezium ABCD.

Then by the help of your ſcale and compaſſes, you find the perpendicular of the triangle A B C to be 6.02, and of the other, viz. CDA 6.01, which added, are 12.03, whereof the half ſum is 6.01; by which, multiplying the baſe 10.02, the content of the field will be 6 acres, 0 roods, 3 perches.

The baſe	10.02
Half perpend.	6.01
	1002
	60120
	6|02202
	4
	1|08808
	40
	3|52320

Before

Before we paſs any farther, let it be remembered,

1. Any quadrangular cloſe, or parcel of ground whatſoever, having right lines, may be thus meaſured, protracted, and computed.

2. The odd meaſure above perches, is not valuable here, nor in the former computations, being always under a ſquare perch; but in multangulars, where there be many remainders, they muſt be ſummed up, and the perches contained in them added to the content before found.

3. This laſt, and the following figures, are made, that they might not be too large, by a ſcale of 400 in an inch, *i. e.* by the leſs diagonal ſcale, each chain and link being counted two.

III. Fig. 17. If this multangular figure be conceived to repreſent a cloſe of ſeven ſides, which is to be meaſured, begin at the remarkable angle A, and going round the cloſe, find the ſides will be 3.11, 2.49, 2.47, 1.77, 4.11, 2.29, 4.37.

Then meaſure the four diagonals, B D, D F, F B, and B G, in the order you will find them to be 3.45, 4.97, 4.13, and 4.36, which is as ſhort a way as can be taken, to prevent unneceſſary walks.

But when you come to protract by the help of your ſcale and compaſſes, firſt make the triangle B C D of the firſt diagonal, and the ſecond and third ſides. Then the triangle D E F upon the ſecond diagonal, and fourth and fifth ſides; and upon the ſame diagonal as a common baſe the triangle B D F of the firſt, ſecond, and third diagonals.

Next of the ſame third diagonal, together with the 4th and 6th ſides, make the triangle B F G, and upon the 4th diagonal, as upon a common baſe with the firſt and laſt ſides, the triangle A B G. So is the whole cloſe plotted.

And now it ſtands viſibly reduced into two trapezias A B F G and B D E F, together with the triangle B C D, which we ſhall not now caſt up, having ſo often ſhewn how ſuch work is to be done.

But it muſt be acknowledged that this method of plotting parcels of land that have many angles, requires not only more care and pains, but greater ſkill and memory than to draw diagonals upon paper, when the plot is already taken by the plain table, or other ſtanding inſtrument. We ſhall therefore, to help our young practitioner in this caſe, adverti ſe him of two eaſy ways to help himſelf, ſo as to be out of danger of miſtakes.

One way is, to divide the multangular field into two or more parts, as the laſt might have been by the diagonal B F; then might each part have been meaſured ſeverally, as if they had been ſeparated by a pale, or were ſundry men's lands parted by a boundary.

Another way that much helps both the underſtanding and memory is, to draw a rude draught of the figure of the land you intend to meaſure, not only as to the ſides, but alſo neceſſary diagonals. Then meaſuring the lines upon the ground correſpondent to thoſe on the paper, ſet the lines as you meaſure them upon the lines of the draught, as if it were the true ones, and when you have finiſhed your meaſuring, protract it truly. Such as you ſee here, but it is better larger, to do your buſineſs; for it is not a pin matter how rude or falſe the lines or angles be, reſemblance being all that is deſired.

Concerning the meaſuring of circles, and their parts.

We have hitherto purpoſely abſtained from meddling with the circle and its parts, that we might lay thoſe things cloſe together without unneceſſary mixtures, that are of greateſt uſe.

It is very rare if a land meter ever has occaſion to meaſure any field or parcel of land, that will prove either circle, ſemi-circle, quadrant, or ſector. Sometimes indeed there will be a little crook in an old hedge bowing like an arch; but we have never ſeen any offer to meaſure it as a ſegment, but always take it as an angle or angles.

Yet becauſe it may be expected we ſhould ſay ſomewhat of thoſe things, we ſhall briefly do it.

I. To meaſure a circle in the more exact way, is, to ſquare the diameter, and to multiply that ſquare by 7854; ſo ſhall the content be in integers and decimals.

But the more uſual and quick way, (and near enough for any uſe we ſhall make of it) is, to multiply the half of the periphery or circumference by the ſemi-diameter.

In like manner to find the content of a ſemicircle, quadrant, or ſector, made up of ſemi-diameters, and arched lines, multiplying the half arch by the ſemi-diameter, gives the content.

Fig. 19. But that which falls out moſt frequently in menſuration, tho' ſeldom much regarded, except where a curious exactneſs is required, is that particular ſort of ſegment which we call a ſection, leſs than a ſemi-circle, ſuch as the figure A B C. And to find the content of it, the center of the circle, whereof this is a ſection, muſt be firſt found, as here at O, from which lines drawn to A and B, make up the ſector A O B C: which being meaſured according to the laſt rule, and from the content thereof, the content of the triangle A O B ſubſtracted, the difference or reſidue is the content of the ſection A B C.

But two queſtions may be here demanded:

1. How may the center be found? 2. How may ſuch a portion of land be truly protracted and computed?

To the firſt we anſwer, that the moſt exact and artificial way, is, by making a mark any where in the arch.

As for Example,

At the point C, and then, by a problem known not only to every ſurveyor, but to ordinary carpenters and joiners, for finding the center of a circle, whoſe circumference will paſs through 3 given points that are not in a right line, as A C B, to find the center O. But if you know not how to do it ſo, croſs the line A B in the middle, as here it is done by the perpendicular O C; ſo you may by a few trials find both the true extent of your compaſſes, and the point in the perpendicular that will fit your purpoſe near enough; for if a little error be committed in making up the ſector, the moſt of it goes off again in the ſubſtraction of the triangle.

II. For the latter, you may take this ready courſe: meaſure the length of both your lines, the chord and the arch, and their diſtance at the middle of them both; then when you come to protract, firſt take the length of your right line from the ſcale, and having laid it down, croſs it in the middle at right angles with a dry line, as in the laſt figure, ſo ſhall it interſect the line A B in the point E; then from the ſame ſcale take the meaſured diſtance between the two lines in the middle, and ſet it upon that dry line from the interſection at E, to the point C. Then, by trials, find a due place in the dry line O E C, and ſuch a diſtance with your compaſſes, that the one foot reſting in that line, the other may deſcribe the arch A C B, and the ſection is protracted.

Concerning cuſtomary-meaſure, and how it may be reduced to ſtatute-meaſure, & e contra, either by the rule of three, or a more compendious way by multiplication only.

Though the ſtatute-perch or pole is 16 feet and a half, and no more, yet there are poles of larger meaſure uſed in many places, as of 18, 20, 21, 24, and 28 feet; nay, in ſome 22 feet and a half. It were therefore very convenient that our young ſurveyor were furniſhed with a chain fitted to the cuſtomary meaſure of the country where he lives. But becauſe theſe are too large and cumberſome for ſmall cloſes, it is very convenient, inſtead of one chain of 100 links, to make two of 2 poles a piece, each pole divided into 25 links, as that of 100 is; which two half chains may, in meaſuring large fields, be tied together by the loops with pack-thread, or joined by a buttoning key-ring for more ſpeedy diſpatch; but in ſmaller we may uſe the half chain of 50 links, only taking care that we count not half chains for whole ones.

And in theſe caſes where the poles are large, and the cloſes ſmall, it were ſtill more convenient if you had a chain of 2 poles only, divided into 100 links. Only you muſt then take notice, that whereas working by whole chains and links, the firſt multiplication, after five cut off, gives the content in acres and parts. The like work by half chains and half links, will give the content in roods or quarters of acres, and parts of ſuch roods.

But tho' it is no hard matter, for one that can find out the length of a link by dividing the number of feet in a chain by 100, and provide himſelf of good iron-wire and curtain-rings to make it of, and a ſharp-edged file, and round noſed plyers to make it with, to be furniſhed with ſuch a chain; yet becauſe every one cannot do this, we ſhall ſhew how you may eaſily, and yet very truly, reduce ſtatute-meaſure into cuſtomary, that ſo the chain before deſcribed my do your buſineſs all England over.

Know therefore, for a ground to go upon, that acres bear proportion to one another as the ſquare of their poles; and therefore if you multiply 33, the number of half feet in the ſtatute-pole, by itſelf, which gives 1089, and alſo multiply the number of half feet contained in a pole of that meaſure you would reduce into; in the ſame manner you may, by the rule of three reverſe, obtain your deſire, making to that purpoſe 1089 the firſt number, the ſtatute-meaſure the ſecond, and the ſquared half feet of the pole given the third. As for example: ſuppoſe of a cloſe meaſured by the ſtatute-pole, the length and breadth, and their product be as here

9.33L. repreſented in the margin. And it is de-
7.21B. ſired that the content may be caſt up ac-
——— cording to the large Cheſhire meaſure of
933 eight yards, or 24 feet to the pole or rod.
1866 Then before you cut off any figures, conſi-
6531 der that in the ſtatute-pole are 33 half feet,
——— and in the Cheſhire pole 48; multiply
prod. 672693 therefore 33 by 33, and 48 by 48, and you will have 1089 and 2304, which, together with the ſaid product, may be thus placed: 1089,672693:: 2304, and ſo multiplying 672693 by 1189 and dividing their product, being 732562677 by 2304, the quotient is 317952; from which, if 5 figures towards the right hand be cut off, the content, by this cuſtomary-meaſure of 24 feet to the pole, will be 3 acres, 0 roods, 28 perches, as here appears:

3|17952
4
——
1|71808
40
——
28|72320

But if the lines on the land had been meaſured according to that cuſtom of 24 feet to the pole, and the content muſt have been found according to ſtatute-meaſure, then we muſt have multiplied the product by 2304, and have divided that latter product by 1089. And in the ſame method you may proceed in all or any of the reſt. But the truth is, that though this way be very exact, plain, and comprehenſive, ſuiting all the cuſtomary meaſures before-mentioned without fractions, it is ſomething tedious, except the practitioner knows how to relieve himſelf by a large table of logarithms, which we cannot ſtand here to treat of. Therefore, to contract the work a little, take notice, that all the cuſtomary poles being mentioned, ſaving only thoſe of 20 and 28 feet, which we ſuppoſe are ſomewhat rarely uſed, having never heard nor read of them, but in Mr. Holwell; all the reſt are capable of being divided into half yards: and therefore, if inſtead of ſquaring the half feet, you ſquare the half yards of both poles, and work with them, you will attain the ſame end without any regardable difference, the ſmall diverſity that there is, being generally in the uſeleſs remainders, not at all affecting the deſired quotient that gives the anſwer near enough for uſe.

As for example.

If we had ſquared 11, the number of half yards in the ſtatute-pole, which would make 121, and alſo 16 the number of half yards in the Cheſhire pole, which would make 256, and then multiplied the firſt product 672693 by 121, the ſecond product would have been 81319853, which being divided by 256, the quotient would have been, as before, 317952. And this way is in a manner co-incident with Mr. Holwell's firſt method.

11 11 — 11 11 — 121 — 16 16 — 96 16 — 256

Take notice alſo once for all, that whether you uſe either of theſe or the following methods, you need not reduce the particular ſquares, triangles, or trapezia's ſeverally; but ſum up all their products together, and then reduce all at once.

But if you would reduce ſtatute-meaſure into cuſtomary by multiplication only, take notice of this preſent table following.

The content by the ſtatute-pole being multiplied by	.84027	Gives the content by the pole of	18
	.68062		20
	.61734		21½
	.53777		22
	.47265		24
	.34725		28

Feet.

The uſe of this Table.

When you have multiplied lengths by breadths, or halfs by half perpendiculars, multiply theſe products by the decimal fractions anſwering to the cuſtomary-meaſure, into which you would reduce ſtatute-meaſure, and from that latter product, firſt cut off five places towards the right hand, as not to be regarded, being only parts of a ſquare link,

link, then cutting off five more, and proceeding to multiply by 4, and then by 40, as hath been often ſhewn, you will have the content by that cuſtomary-meaſure.

Example.

Suppoſe the length of a cloſe meaſured by Gunter's chain and multiplied by the breadth meaſured alſo by the ſame, produced 672693 ſquare links; and it is deſired that the content may be given in Cheſhire meaſure of 24 to the pole; you muſt multiply 672693 by 47265, the decimal fraction anſwering to 24 feet, and from that product, being 31794834645, cut off and caſt away 5 places, and the reſt being 317948, are in the uſual way eaſily reducible into 3 acres, 0 roods, and 28 perches, as here appears, agreeable to what it amounted to in the former method.

3|17948
4
——
1|71792
40
——
28|71680

But if you meaſured by a chain of cuſtomary-poles, and deſire to know what the content is in ſtatute-meaſure, this following table is for your purpoſe.

Feet.

The content meaſured by the pole of	18	1.19008	gives the content by the ſtatute-pole.
	20	1.46923	
	21	1.61983	
	22½	1.85950	
	24	2.11570	
	26	2.87970	

being multiplied by

To underſtand which, take this example.

Suppoſe the length and breadth of a long ſquare being meaſured by a chain of 24 feet to the pole, and multiplied together, make their product 317952, let this be multiplied by 2.11570, which anſwereth to 24 feet, and the latter product will be 67269104640; from which, if you cut off and caſt away 5 places towards the right-hand, the remainder is 672691; which, in the uſual way, is eaſily reduced to 6 acres, 2 roods, and 36 perches.

6|72691
4
——
2|90764
40
——
36|30560

One thing more, and we have done with this buſineſs of reduction. If the content to be reduced be caſt up into acres, roods, and perches, reduce all into perches, and then in other reſpects work as before, either by the Rule of Three, or by this laſt method of multiplication only. So ſhall you have the content in ſquare perches, according to the meaſure deſired, which you may reduce into acres by dividing them by 160; and if any thing remain, that remainder being divided by 40, will give you the roods in the quotient, and the latter remainder the number of ſquare perches.

For trial of which rules, remember the anſwer of theſe two following queſtions wrought all three ways.

Queſt. 1. *How many acres, roods, and perches according to the pole of* 18 *feet, contained in* 5 *acres,* 3 *roods, and* 11 *perches ſtatute-meaſure?*

Anſ. 4 acres, 3 roods, and 22 perches, as here appears.

I. *Method.*

			A.	R.	P.
33	36	5	: 3	: 11	
33	36	4			
99	216	23			
99	108	40			
1089	1296	423			

1089 . 931 :: 1296
1089
8379
7448
9310
1013859
1296) 1013859 (782
9072
10665
10368
2979
2592
387

160) 982 (4
640
40) 142 (3
120
22

II. *Method.*

11 12 : 121 . 931 :: 144
11 12 121
11 24 931
11 12 1862
121 144 931
144) 112651 (782
1008
1185
1152
331
288
43

160) 782 (4
640
40) 142 (3
120
22

Or thus:

40) 782 (19
40
382
360
22

4) 19 (4
16
3

III. *Method.*

.84027
931
84027
252081
756243
782.29137

160) 782 (4
640
40) 142 (3
120
22

Queſt. 2. *How many acres, roods, and perches of ſtatute-meaſure, are contained in* 8 *acres,* 3 *roods, (or quarters) and* 21 *perches of* 21 *feet to the pole?*

Anſw. 14 acres, 1 rood, and 21 perches, as appears by the three following works in the ſeveral methods.

I. *Method.*

A. R. P.
8 : 3 : 21
4

35
40

1421

42 33
42 33

84 99
168 99

1764 1089

1764 . 1421 :: 1089
1764

5684
8526
9947
1421

1089) 2506644 (2301
2178

3286
3267

1944
1089

855

160) 2301 (14
160

701
640

40) 61 (1
40

21

II. *Method.*

14 11 196 . 1421 :: 121
14 11 196

56 11 8526
54 11 12789
1421

196 121 221) 278516 (2391
242

365
363

216
121

160) 2301 (14 95
160

701
640

61
40) 61 (1
40

21

III. *Method.*

1.61983
1421

161983
323966
647932
161983

2301.77843

160) 2301 (14
160

701
640

40) 61 (1
40

21

How to measure a piece of land with any chain of what length soever and howsoever divided; even with a cord or cart-rope, being a good expedient when instruments are not at hand of a more artificial make.

If you can procure a chain, and find it is not divided as before hath been shewn, but into feet or quarters of yards, or any such vulgar divisions, make no reckoning of the divisions at all, but measure it as exactly as you can find out the true length of the whole chain; and if it fit none of those lengths mentioned before, nor any of their halfs, make it fit by taking off a link or two, or piecing it out with a string; then dividing the length of that chain by 100, or the half of it by 50, find the true length of a link according to our artificial divisions, and having got a long stick or rod, set as many of those link-lengths upon it as it will hold; then may you measure all the whole chains by your regulated chain, and the odd links of every line by your divided stick or rod, as is manifest in this example following.

Being far from any instrument, and requested by a friend to measure him a close, you must procure a pair of compasses, an ordinary carpenter's rule of two feet, divided into inches and quarters, and also with a piece of an old chain seemingly divided into feet, measure it by the rule, and finding it to be 45 feet long, and some odd measure, piece it out with a pretty strong cord that will not stretch much, to 48 feet exactly; then it will serve for half a chain of 24 feet to the pole: this 48 multiply by 12, the number of inches in a foot, and that product being 576, divided by 50, the number of links in half a decimal chain, and the quotient is $11\frac{66}{100}$ inches, or 11 inches and an half, and a trifle over: dividing therefore a long stick throughout into such parts, each containing 11 inches and a half, besides the breadth of the nicks, you are provided of tools to measure lines to a link with exactness enough.

In like manner you proceed with a cord or rope, having fittted them to some known length or other; and then for protracting, it were easy with the compasses to make a plain scale of a large sort, either upon paper or an even piece of wood. This for once may serve a man's turn well enough.

Besides, there is a way of measuring the perpendiculars of triangles and trapezias upon the ground itself, so as prevent the necessity of a scale; for if you have a little square with a hole in it to turn upon the head of a little stick, which you may fix where you please, as you are measuring the base of a triangle, or the diagonal of a trapezium, you may by a very few trials find the place where the one leg will be just in the line you are measuring, and the other point at the angle from which the perpendicular falls on it, and then the space between your stick and that angle truly measured, is the perpendicular.

If

If you have not ſuch a ſquare, a ſquare trencher, or any end of a board that hath one right angle, and two true ſides, will ſupply the want of it.

And we ſhall make bold to add, that this is a good way to meaſure a trapezium, tho' it be protracted afterwards; for by meaſuring the perpendiculars as aforeſaid, and obſerving at how many chains and links end the ſaid perpendiculars meet the common baſe, the whole trapezium may be truly protracted without going about it; this little ſquare competently ſupplying the place of an inſtrument, which is uſually called a croſs or ſquare, made up, as it were, of two ſmall indices, like thoſe for a plain table, but much leſs, with fore-ſights and back-ſights, and cutting one another at right angles put together, and having an hole at the center.

Concerning dividing of land artificially and mechanically.

1. To divide a triangle into any parts required; divide the baſe as the demand imports, then ſhall lines drawn from the points of diviſion to the oppoſite angle, finiſh the diviſion of the triangle.

Example.

Fig. 20. A C, the baſe of the triangle A B C, being divided into 12 equal parts, a line drawn from the angular point B to the point 6, divides the triangle into two equal parts; 2 lines drawn to 4 and 8, divide it into three equal parts; two lines drawn to the points noted with 3, 6, and 9, divide it into four equal parts; and ſo lines drawn to 2, 4, 6, 8, 10, divide it into ſix equal parts.

Alſo it is very obvious, that if the ſame triangle were ſo to be divided, that the one part ſhould be double to the other, a line drawn from B to 4 or 8, doth the work, or if it be required to divide it into two parts, ſo as the one ſhall be triple to the other, a line drawn from B to 3 or 9, compleats the work. So alſo a line from B to 2 or 10, divides it into two parts, whereof the one is quintuple, or five-fold, to the other, and a line from B to 1 or 11, divides it into two parts, whereof the one is 11 times as large as the other.

Farther yet, if it were required this triangle ſhould be ſo divided that the two parts ſhould in quantity bear proportion as 5 and 7, a line from B to 5 or 7, will anſwer the intention.

The diviſions will indeed be ſometimes a little more intricate than this, yet not ſuch, but that the ſeeming difficulty may be eaſily overcome by obſerving the following method.

Suppoſe a large triangle of common land to be divided amongſt three tenants, A, B, and C, according to the quantity of their tenements, A, having 19 acres of land to his tenement, B 13, and C 7, the baſe of the triangle being found by meaſure to be 17 chains and 17 links; and the demand is, where the point of the diviſion muſt be placed in the baſe, ſo as lines drawn from thence to the oppoſite angle, ſhall truly limit each man's part.

19 To anſwer this, let us add 13 and 07 to 19, and
13 they give 39; ſo is the work plainly reduced to the
07 rule of fellowſhip; and therefore to find every man's
— diſtinct portion, we need only to multiply the baſe by
39 his particular number, and divide that product by
39. the ſum of all their numbers.

A

29 . 17.27 :: 19.
19

15543
172

39) 32813 (841 14/29
312

161
156

53
39

14

B

39 . 17.27 :: 13
13

5181
1727

39) 22451 (575 26/29
195

295
273

221
195

26

C

39 . 17.27 :: 7
7

39) 12089 (309 8/39
117

389
351

38

From theſe operations it is plain that if we ſet off from the angular point where the baſe begins, 8 chains, 41 links, and a little above the third part of a link upon the baſe for A, and where that ends, 5 chains and 75 links and 2/3 of a link for B, and conſequently leave between this ſecond diviſion and the other end of the baſe 3 chains and almoſt 10 links for C; lines drawn from thoſe points of diviſion to the oppoſite angle, will give each man his due.

What has been ſaid touching the diviſion of triangles upon their baſes, will, with a little variation, ſerve for the dividing of all ſorts of parallelograms, whether ſquares, long ſquares, rhombuſes, or rhomboides; all the difference is, that inſtead of drawing lines from points in the baſe to the oppoſite angle, you muſt draw parallel lines from points in one oppoſite ſide to another, as will be ſufficiently plain by this one inſtance.

Fig. 7. Suppoſe the ſquare figure to repreſent a cloſe of ſix acres, and you are to cut off an acre at the ſide A C; having ſet off the 6th part of the line C D, from C towards D, and alſo from A towards N, a parallel drawn between thoſe points, takes off exactly a 6th part of an acre.

If it be not thought convenient, as in ſome caſes it is not, to cut off a piece ſo long and narrow, you may by the Rule of Three find what other length of any greater breadth will limit an equal quantity to it. Or you may multiply the breadth by 2, 3, or any other, and divide the length by the ſame number that you multiplied the breadth by. Or laſtly, if you ſet out a double proportion that is 2/6 or 1/3, from C towards D, and from the point where it falleth, draw a line to the angle A, you will have a triangle equal to 1/6 of the ſquare A C D N.

But to return to triangles, the moſt ſimple and primitive of all rectilinears, and therefore the moſt conſiderable in this caſe of partition, as giving laws often to the reſt, it may fall out that a triangle muſt be divided, by a line from ſome point in a ſide, ſo as that line may either be parallel to ſome other ſide, or not parallel to any.

Fig.

Fig. 21. Let A B C be a triangle given, and it is required to cut off $\frac{3}{5}$ by a line parallel to A B. Firſt, on the line AC deſcribe the ſemi-circle A E C, whoſe diameter C A divided into five equal parts according to the greater term, and upon three of thoſe parts, the leſſer term, erect the perpendicular D E, which cutteth the arch line in E; then ſet the line from C E from C to F, and from thence draw the line E G parallel to A B; ſo will the triangle C G F contain $\frac{2}{5}$ of the triangle A B C, as was required.

Fig. 22. Now, for the latter caſe, when the line of partition goes not parallel with any ſide, take this example:

Let ABC be a triangle given to be divided into two parts which ſhall bear proportion to one another, as 3 and 2, by a line drawn from the point D in the baſe, or line AC.

From the limited point D, draw a line to the angle B; then divide the baſe A C into five equal parts, and from the third point of the diviſion draw the line to E parallel to B D. Laſtly, from E draw the line E D. So ſhall the trapezium A B E D be in content as 3 to 2, to the new triangle D E C.

We ſhall have now done with the diviſion of triangles, whenwe have added the three following advertiſements.

1. You muſt be ſure to take very exactly the diſtance of every point, where a dividing line cutteth any ſide, to one or the ends of the ſame ſide, as in this laſt figure, the diſtances B E and A D; which diſtances being applied to the ſcale by which the triangle was protracted, will ſhew at how many chains and links end you are to make your dividing line on the field itſelf.

2. The proportions by which you are to divide, are not always ſo formally given as in the former examples, but are ſometimes to be found out by arithmetical working, as in this caſe.

Suppoſe a triangular field of 6 acres, 2 roods, and 31 perches, muſt be divided ſo as the one of the two parts ſhall be four acres, 3 roods, and 5 perches, and the other, conſequently 1 acre, 3 roods, and 26 perches; reduce both meaſures into perches, and the one will be 705, and the other 306. Their ſum is 1701, which, by their common meaſure, being reduced into their loweſt terms of proportion in whole numbers, will be 5, 2, and 7, which ſhews that the triangle being divided into 7 equal parts, the one muſt have 5 of thoſe 7 parts, and the other 2. And obſerve that it will be ſufficient to find the common meaſure between the ſum of your terms, and either of the terms; the method whereof is ſhewn in every arithmetic-book for reducing fractions into their loweſt terms.

But the reader may multiply either of the parts; as ſuppoſe 765, by the length of the baſe, which we will ſuppoſe to be 8 chains and 75 links, or 87 links; and that product divided by 1071, the content of the whole cloſe in perches, gives the rule of three direct, 625 links, or 6 chains and 1 pole, the true diſtance from either end of the baſe, that his mind or occaſions may direct him to begin with, to the point of diviſion; for the diviſion muſt be not only for proportion or quantity, but alſo as to poſition or ſituation of parts upon the paper, as it is required to be on the ground.

3. In theſe and all other diviſions of land, where a ſtrict proportion in quantity is to be obſerved, you muſt have reſpect to the rules given hereafter concerning meaſuring of uneven ground, eſpecially if one part prove much more uneven than another: and if there be any uſeful pond, or well to draw your line of diviſions through it; but if it be an uſeleſs pond, lake, or puddle, or if there be any boggy or barren ground, that muſt be caſt out in the diviſions, meaſure that firſt, and ſubſtract it from the content of the whole cloſe, and then lay the juſt proportion of the remainder on that ſide that is free from it, that the other may have its juſt part alſo, beſides that which is uſeleſs.

What hath been ſaid, with an ordinary meaſure of diſcretion, may ſufficiently inſtruct a young artiſt to divide triangles, parallelograms, and regular polygonials, in an artificial way; but becauſe many cloſes and open grounds are trapezias, and many irregular polygons, and even thoſe that are regular enough, may fall under an irregular diviſion, in regard to the quality of the land, woods upon it, or quarries in it, or the conveniencies of ways, currents of water, ſituation in reſpect of adjacent lands, &c. we ſhall propoſe a method, which though it hath ſomewhat of the mechanic in it, will be ſingularly uſeful in ſuch caſes.

Let A B C D be a trapezium to be divided betwixt a young heir and his mother, ſo as his part may be double to her's. Having by the diagonal B C divided it into two triangles, you will find the content of the triangle A B C to be 138550 ſquare links, and the triangle B C D to contain 103468, in all 242018 ſquare links, which, if reduced, as hath been formerly taught, would amount to 2 acres, 1 rood, and 27 perches.

But for the preſent work, they are in a better order already. Dividing then 242018 into three parts, each of them is 80676 and $\frac{2}{3}$, two therefore of thoſe third parts muſt contain 161353 and $\frac{1}{3}$, which $\frac{1}{3}$ being inconſiderable, regard them not.

Then if you reſolve to lay out the double part towards the line B D, ſtrike at adventures the line E F, and meaſuring the trapezium bounded by that line, and the oppoſite ſide B D, together with the interjacent parts of the lines A B and C D, which you will find to contain 119140 ſquare links; but becauſe it ſhould have been 161353, ſubſtract 119140, out of 161353, and their difference is 42213. and perceiving that the lines A B and C D are very near parallel, and finding their diſtance where they are cut by the line E F, to be 326 links, or 3 chains and 26 links, divide 42213 by 326, and the quotient is 129 links, and almoſt half, at which diſtance draw the line G H parallel to E F; ſo ſhall the trapezium G B D H be the heir's part.

Another way whereby the ſame thing may be performed is this. Finding the triangle A B C to contain 138650 ſquare links, ſubſtract it out of the heir's part, viz. 161353, the difference 22803, ſhews how many ſquare links muſt be taken out of the triangle B C D, and added to the triangle A B C; which to perform with all neceſſary exactneſs, ſuppoſe the ſide or line B D to be the baſe, which by meaſure proves to be 344 links, or 3 chains and 44 links. Say by the Rule of Three direct, if the whole content of the leſſer triangle, viz. 103468, give 344, what ſhall 22803 give? So will the reſult be 75 links, and ſomewhat more than $\frac{4}{5}$, or a link, for 22803 multiplied by 344, gives 7844232, which being divided by 103468, the quotient is $75\ \frac{18413232}{103468}$; or according to decimal diviſion, 75,8131, which is ſomewhat more than 75 links and $\frac{4}{5}$, wherefore extending your compaſſes upon the ſcale to almoſt 76 links, ſet that diſtance upon the line B D, from B to I, and draw the line C I: ſo ſhall the trapezium A B I C be double to the triangle I C D, within ſo ſmall a matter as is not worth regarding, though the land were a rich meadow.

We hope it will be unneceſſary to tell any man of ſenſe, that if he pleaſe he may begin with the leſs part, and take out

out that; or if there be many partners, he may divide betwixt any one and all the reſt, putting their parts together, and then by the ſame method ſub-divide amongſt them till each hath his due ſhare; not to ſpend many words in telling him he muſt ſubſtract where he hath, by ſeparating a line at adventures, or by chooſing out a triangle, taken too much, as we added, when we took too little. Nor laſtly, that theſe methods are not only applicable to trapezias, but to any triangular figure whatſoever, whether regular or irregular.

Concerning the boundaries of land, where the lines to be meaſured muſt begin and end.

If there be no agreement between the parties concerned, for if there be, that muſt be obſerved, reaſon and cuſtom are the ſurveyor's guide.

The farmer ſpeaks loudly, that when a piece of arable or meadow land, is let for a year to be ſown or mown, no more ſhould be meaſured, nor expected to be paid for, either to the letter or workmen, than the plow or ſcythe can go over. So alſo when a parcel of land is let for paſture by meaſure to a farmer, it ſeems very reaſonable, that all, and only ſo much ſhould be meaſured, as is uſeful to that purpoſe.

But commons to be encloſed are uſually meaſured, except it be otherwiſe agreed, to the uttermoſt bounds of every man's particular proportion, without any allowance for ditch or fence, every man being to make them upon his own of what breadth he pleaſes. Nor is this unreaſonable, for it is as good for one as another, and the rate paid to the lord is uſually very little, ſometimes nothing.

It is alſo very uſual in meaſuring betwixt lord and tenant, in caſes of leaſes for lives, and long terms of years, to extend the lines to the utmoſt bounds of the tenant's claim, taking in the very walls, hedges, and ditches: but this is accounted very hard, and oft proves very unequal among the tenants of a lordſhip, ſome being forced to make much more waſte of their ground this way, than others that hold as much or more. But where the cuſtom obtains, the ſurveyor muſt obſerve it; for it is others work to appoint what muſt be meaſured, and his only to meaſure truly what is ſo appointed. A good landlord may, and will be apt to conſider it in his rates, and a bad one it is like will be tenacious of a cuſtom to his own advantage.

Laſtly, in caſe of a ſale by meaſure at a rate agreed upon per acre, no boundaries being ſpecified in the bargain, the rule is to extend the lines to the quick wood-row, that is, to the place where the quick wood actually groweth, or where, according to cuſtom, it ought to be ſet.

Containing a deſcription of the plain table, the protractor, and lines of chords.

Though what hath been already ſaid, may competently ſuffice to inſtruct the young artiſt in meaſuring a cloſe of land, yet to advance him a degree higher in uſeful knowledge, we ſhall take occaſion to deſcribe unto him the plain table, which conſiſts of ſeveral parts.

1. The table itſelf, which is a parallelogram of wood fourteen inches and a half long, and eleven inches broad, or thereabouts, and for neceſſity may be made by an ordinary country workman of one board; but for neatneſs, convenience of carriage, and freedom from warping, it is uſually made of three little boards joined together ſideways, with a ledge at each end to hold them faſt together, and upon the middle board a ſocket of braſs fixed with three ſcrews, and with a fourth to be faſtened on the head of a three legged ſtaff; of which anon.

2. A frame of wood fixed to it, ſo as a ſheet of paper being laid on the table, the frame being forced down upon it, ſqueezeth in all the edges, and makes it lie firm and even, ſo as a plot may be very conveniently drawn upon it. This is uſually made with joints for more eaſy carriage, but a plain one may ſuffice. Upon one ſide of this frame ſhould be equal diviſions, for drawing parallel lines both long-wiſe and croſs-wiſe, as occaſion may require, over your paper, and on the other ſide the 360 degrees of a circle projected from a centre of braſs conveniently placed in the table.

3. A box with a needle and card, to be fixed with two ſcrews to the table, very uſeful for placing the inſtrument in the ſame poſition upon every remove.

4. A three-legged ſtaff to ſupport it, the head being made ſo as to fill the ſocket of the table, yet ſo as the table may be eaſily turned round upon it, when it is not fixed by the ſcrew.

5. An index, which is a large ruler of wood, or rather braſs, at the leaſt ſixteen inches long and two inches broad, and ſo thick as to make it ſtrong and firm, having a ſloped edge, by which we draw the lines, called uſually the fiducial edge, and two ſights of one height, whereof the one hath a ſlit above, and a thread below, and the other a thread above, and a ſlit below, ſo ſet in the ruler, as to be perfectly of the ſame diſtance from the fiducial edge. Upon this index it is uſual to have many ſcales of equal parts, and there might be a diagonal ſcale if the inſtrument-maker pleaſe, and lines of chords of ſundry lengths; but if you have ſuch a ſcale as before deſcribed, you need not to have them here.

The protractor is an inſtrument ſo well known and ſo eaſy to be made and procured, that we ſhall be very brief in the deſcription of it. As it is uſually made, it conſiſts of two parts, a ſcale and a ſemi-circle, but the ſcale is no neceſſary part of it, but ſerving, if you be not otherwiſe provided, for other uſes before-mentioned in the caſe of plain ſcales.

But the ſemi-circle is more eſſential, and it may be made of braſs, or other metal of any convenient ſize, as four inches, more or leſs, for the ſtrait ſide, this ſemi-circle being bounded as all others are by two lines, the one right or ſtraight, the other circular.

The right line is divided in the preciſe middle, by a point which is in the center, upon which the circular boundary is drawn, and two other arches concentrical with it.

The center, when the ſemi-circle goes alone without the ſcale, ſhould be guarded with two little lips, on each ſide one, or a little loop, for more convenient turning of the inſtrument about upon a pin fixed in a paper.

The arched or circular edge is divided into 180 degrees, or equal parts, numbered by tens, upon the upper concentrick arch from 0 to 180, and in the lower from 180 to 360. So that by applying the ſtrait edge of the protractor twice to any line, keeping the center right upon a pin fixed in the line, that is, with the ſemi-circle firſt above it, and then below it, contrarily, you may draw a whole circle by the guidance of the arch, or ſet out any number of degrees, as will appear more plainly hereafter.

A line of chords is a line divided into 90 unequal parts, whereof 60, and the radius upon which the circle was drawn, are equal, and the diviſions upon that line are equal to the next extent in a right line, of ſo many degrees from the beginning of the quadrant, as anſwer thereunto.

When lines of cords are cut upon wood, it is both uſual and neceſſary that there be two ſtuds of braſs, the one at the beginning, and the other at 60 degrees, with little holes for the feet of the compaſſes, when you take the extent of the radius, to preſerve the line from being wounded by the compaſſes; and being thus fenced, it will for need do the work of a protractor, but not altogether ſo commodiouſly.

How to take the true plot of a field by the plain table, upon the paper that covers it, at one or more ſtations.

There are three ways or methods for doing this work, two more uſual and ordinary, the third more unuſual and extraordinary, though now pretty well known to moſt ſurveyors, and in late books publiſhed. The firſt performs the work by meaſuring every line from the inſtrument to every angle, and is a very ſure ſubſtantial way where it can be done, as it ordinarily may in moſt cloſes.

The ſecond doth it by meaſuring only the ſtation or the diſtances, and is very quick, but not ſure and exact as the other; yet if managed by a ſkilful artiſt, that knows how to plant his inſtrument, ſo as to avoid making acute angles unneceſſarily, it will come near enough the matter in many places; as in meaſuring for workmen, that take the mowing or reaping the fields by the acre, or when tythes are let at a ſmall value per acre, as in poor barren pariſhes they uſually are.

The third is the way of circulation or perambulation, the inſtrument being oft to be planted, and the plot to be meaſured about; by which not only difficult cloſes, but even the thickeſt woods, yea, bogs, meres, and pools of water, may be plotted, which by neither of the other methods can be performed.

In all theſe methods, two things are to be performed.

1. At every angle where there is no perſpicuous mark already, as a tree, buſh, ſtile, &c. one muſt be placed, as a white paper, or ſuch like; or elſe ſome one muſt go from angle to angle, and remain there as your mark to look at, till you bid him remove to another; only when angles are near you, this labour may be ſpared.

2. Whenever you have occaſion to plant your inſtrument more than once, as it will often fall out in the firſt method, and ever in the two latter, you muſt be ſure it ſtand juſt as it did the firſt time for ſituation; for which your needle, if well touched and hung, will be a good direction, but is not thought ſufficient without back-ſight and fore-ſight. The firſt method is this.

1. When you go about to plot your parcels of land, find ſuch a place in it, if poſſible, from whence you can ſee all the angles, and in that place plant your inſtrument covered with a ſheet of paper, and turning it about till the needle playing at liberty, hang over the flower-de-luce, or any other notable place that you make choice of, ſcrew it faſt. Then chooſing any convenient place in your paper for a center; and to repreſent your ſtation, or place where you fix your inſtrument, make a prick with the ſmall point of your compaſſes; to which prick applying the fiducial edge of the index, which is eaſily done if you keep the point of your compaſſes reſting in it, direct the index, by the ſight to all the angles; and when through the ſlit, or long ſight you ſee the oppoſite thread, cut the mark in the angle, draw a neat dry line along the fiducial edge, to or from the center; then meaſuring from the inſtrument to every angle, ſet the meaſure by a ſcale and compaſſes from the center towards the angle upon the line that points at it, making a prick in the line where the chains and links reckoned from the center truly end; then ſhall lines drawn by a ſtrait line from prick to prick, give you the perfect plot upon your paper, which you may divide, as hath been before ſhewed, into trapezias and triangles, and ſo find the true content. To make which plain, mark this example.

Fig. 24. Suppoſe A B C D E F G H to be a field having planted the plain table, as before directed, at a convenient advantage, ſo as to ſee all the angles, as at I, a prick to repreſent the ſtation in the little circle ⊙ marked with I, upon which laying the fiducial edge of my index, and directing the ſights to all the angles, draw dry lines towards A, and all the reſt of the angles in order from the center; and then meaſuring upon the ground from the inſtrument to the angle A, and find it to be 3.45, which ſet from the center to the point A, and ſo upon all the reſt, according to their due meaſures, and then black lines drawn from point to point, as from A to B, from B to C, &c. limit the true figure of the field according to the ſcale uſed. viz. of 400 in an inch.

And now before we paſs to farther varieties, let the reader take notice of theſe following things.

1. From henceforth we ſhall forbear to take any notice of the meaſures of lines meaſured from the inſtrument to the ſeveral angles, having ſo often ſhewed how to meaſure by a ſcale.

2. When we ſpeak of meaſuring from or to the inſtrument, we always mean from or to that part of ground that is perpendicularly under the head of the inſtrument where you are to draw your plot, which will ever be encloſed with the three legs of your ſtaff.

3. That it is uſually the quickeſt way to meaſure firſt from the inſtrument to the firſt angle, and then back from the ſecond angle to the inſtrument, and ſo the reſt in order, ſtill one from the inſtrument, and the other to it.

4. It is no matter at all whether your plain table be placed towards the middle of a field, as was repreſented in this figure, or at an angle, as will appear hereafter.

5. In all workings by this inſtrument, you muſt have a care that the inſtrument be not moved out of its due place, till you have finiſhed the work of the preſent ſtation; for which purpoſe, caſt your eye now and then upon your needle, obſerving whether it continue to hang directly over the ſame point you ſet it at when you began your work, and to rectify your inſtrument if you ſee cauſe. But becauſe all tables have not needles, and where needles are, they are not accounted very accurate, make uſe of the following help.

When you have planted your inſtrument, and made a point or prick in your paper, repreſenting your ſtation, ſet the fiducial edge of your index to it, and turning it ſoftly about till you find one remarkable thing or other upon one ſide of the cloſe, and another on the oppoſite ſide, as you look through the ſights of your index, which we call fore-ſight and back-ſight, draw a remarkable line with ink, or rather with a black-lead pen quite over your paper, which in this figure is repreſented by the black line K L; and then, if you ſuſpect that by any accidental jog, or other caſualty, the

the inſtrument is any thing removed, you may eaſily try, and rectify it by applying the fiducial edge to the ſame line, and making uſe of fore-ſights and back-ſights again upon the ſame marks which you before obſerved upon the oppoſite ſides of the cloſe.

But if there be no convenient place for the placing of your inſtrument, whence you may ſee all the angles of the field, more ſtations muſt be made uſe of thus.

Fig. 25. Let A B C D E F G H I K L M N be a field whoſe angles cannot be all ſeen from any one angle, or other place in it. Plant your inſtrument at the angle A, and if it have a needle, mark what degree of the chord it cuts, or turn about the table on the head of the ſtaff, till the needle hang over ſome remarkable place, as ſuppoſe the flower-de-luce, and ſcrew it faſt; then ſetting up a ſtick with a white paper or cloth on the head of it, where you intend your ſecond ſtation, as here at Q, make a prick or point in your paper, to ſignify the point A upon the paper on the table: to which point you muſt apply the fiducial edge of the index, and when you ſee the white at Q, ſo as looking through the ſlit you ſee the thread cut it, draw the line O P quite through the paper with a black-lead pen, and then keeping the fiducial edge ſtill upon the ſame point, and turning it round by degrees, look at the angles B C D E F L M N, ſtill drawing dry lines with the points of your compaſſes, and ſetting on the meaſures from the ſtation A, to every angle meaſured to or from, as in the laſt example.

Then remove your inſtrument to the place of your ſecond ſtation, having ſet up a mark at A, and laying the fiducial edge to the line OP, turn about the table upon the head of the ſtaff, till through the ſlit of the back-ſight, you ſee the thread cutting the mark at A, and then ſcrew it faſt; ſo will the needle, if a good one, hang directly over the ſame point that it did at the firſt ſtation: but however that be, fore ſight and back-ſight will do the buſineſs; for which purpoſe it is good to take back-marks as well as fore-marks at every ſtation, as was taught in the example of a ſingle ſtation, only taking notice that the back-mark, when the inſtrument is planted in an angle, muſt needs be out of the field; as ſuppoſe here at O.

Having meaſured the diſtance between the firſt and ſecond ſtation, and finding it to be 7, 10, ſet it upon the line O P, from A to Q; where make another point to repreſent the ſecond ſtation, and turning about the index with the fiducial edge upon that point, and ſo looking through the ſights at the angles G H I K, draw lines towards them on your paper, and having meaſured between every one of thoſe four angles, and the inſtrument, ſet thoſe meaſures, as you did the other, with your ſcale and compaſſes, from Q towards every angle upon its proper line; and then having the drawn black bounding-lines from A to B, from B to C, and ſo round about the cloſe, the protraction is finiſhed.

But here to make this figure yet more advantageous, remember the following advertiſements.

1. Sometimes a ſtation is ſo taken, that you may meaſure towards two angles at once, as here from Q to G and H, in which caſe you are to ſet down the chains and links where the firſt angle falleth, but ſtill be proceeding to the farther angle, cauſing the remainder of the chains at the fore-end to advance beyond the former angles; ſo going on with whole chains ſo far as you can, to which the odd links at the end are to be added.

2. If at any of your ſtations, as ſuppoſe A, you can ſee an angle, for example E, to which you cannot meaſure in a direct line without paſſing the boundaries of your parcel of land given to be meaſured, you may notwithſtanding take in that angle by a ſtrait meaſured line, as we have done, provided it may be lawfully done without treſpaſs, and conveniently without troubleſome paſſing of fences, otherwiſe it muſt be taken from onother ſtation.

3. One of your ſtations was here taken at an angle, and the other within the body of the field, to ſhew the variety of working taught by other authors, and that it is no great matter where you make your ſtations, ſo you can ſee the angles; elſe it had been full as convenient to have taken the firſt ſtation alſo within the body of the field, as ſuppoſe at R.

4. Though this figure repreſents to your eye only two ſtations, A and Q, your fancy may multiply them at pleaſure; for ſuppoſe the angle H could not have been ſeen from A to Q, how eaſy had it been to have ſet up a mark at S, and then to have removed the inſtrument thither, obſerving the ſame directions that were given at the removal from A to Q?

II. In the ſecond method the inſtrument is to be planted twice, or oftener, as occaſion requires, the rules for removal of the inſtrument fore-ſight and back-ſight, and meaſuring the diſtance of ſtations, being the ſame as formerly taught; but inſtead of meaſuring to and from every angle, we only view each angle through the ſights from two ſtations, having applied the fiducial edge to the points repreſenting thoſe ſtations, and having drawn lines with the point of your compaſſes, or a protracting needle, the interſections repreſent the angles, from which the boundary-lines may be drawn; ſo is the field protracted. Which that the reader may underſtand, let him note theſe three figures.

Fig. 26, 27, 28. In theſe three figures the angles are marked alphabetically, A B C D E F, &c. and the ſtations by a ſmall point in a ſmall circle numbered, 1, 2, or 1, 2, 3, according to their number and order.

Fig. 26. The firſt of theſe figures repreſents the plotting of a field at two ſtations within it, from both which all the angles may be ſeen.

Fig. 27. The ſecond performs the ſame work by two ſtations taken without the field, by which art a cloſe may be meaſured, though the preſent poſſeſſor will not give us leave to come into it.

Fig. 28. The third ſhews how the work may be performed at three ſtations or more, when two ſuch places cannot be found whence to view all the angles; which laſt having more of difficulty than the two former, though indeed not very much, and the explanation of that will ſufficiently help to the underſtanding of them, we ſhall a little explain the meaning of it in theſe particulars.

1. From the firſt ſtation taken according to the former directions, you ſee the angles A B C D F G K, and accordingly draw lines upon your paper towards them from the point repreſenting that ſtation, by the fiducial edge of your index with the point of your compaſſes.

2. Having removed the inſtrument to the ſecond ſtation, and in ſo doing, obſerved the rules before given, you will thence ſee the angles A B C D E F G H I K, and draw lines upon your paper towards them from the point repreſenting the ſecond ſtation. And now viewing your work, you find upon your paper interſections for the angles A B, D F, G K, but only ſingle lines towards the angles C E H I; therefore,

3. Removing the inſtrument regularly as before, to a third ſtation, you will thence ſee thoſe four angels CEHI, and drawing lines towards them, you will have interſections for them alſo; ſo that having drawn the lines AB BC, &c. from one interſection to another, you have the field perfectly protracted. For theſe bounding-lines from angle to angle, do not only ſignify the boundaries of a piece of land given to be meaſured, limiting the figure or ſhape thereof, and are to that purpoſe given in this and all other ſurveying-books, but alſo are the true diſtance by a ſcale from angle to angle for the plot upon the paper; we mean by the ſame ſcale by which the ſtationary diſtances were laid down upon their own lines. And this holds true in all kinds of true plotting, whether in this method or any other.

III. The third method is that of circulation; and this hath ſeveral varieties, according to theſe three following caſes.

1. When the diſtance from angle to angle, without any exception, is meaſured quite round the plot, either within or without.

2. When the diſtance is taken only between ſome more notable angles, and the perpendiculars of the reſt meaſured as you paſs along their baſes, whithin the plot, proper for plain ſolid ground.

3. When the like is done without the plot, as in caſe of plotting thick woods, meres, pools, bogs, &c.

The firſt of theſe are very eaſy, conſiſting in nothing but planting the inſtrument at every angle, either within or without, as neceſſity and convenience determine it, obſerving the former directions for planting and removing the inſtrument, and alſo for meaſuring the ſtationary lines on the ground, and protecting them on the paper, as is manifeſt in this example.

Fig. 29. Let ABCDEF be a park, pond, or cloſe to be protracted, firſt plant your inſtrument at A, and direct the ſights to a mark in the angle B, drawing a dry line from a convenient point on your paper towards B, on the ground, then having meaſured by your chain the diſtance AB, ſet it by a ſcale upon the correſpondent line from A to B, drawing a black line between them with ink or a lead pen, the extremities whereof are the points A and B on the paper, and the little pricked line that goes beyond B, repreſents the remainder of the dry line drawn at random, as to length, with the point of the compaſſes.

Then ſetting up a mark at A, if there was none before, remove your inſtrument to B, and laying the fiducial edge to the line AB, turn about the inſtrument upon the ſtaff, till through the ſight you perceive the thread cutting the mark at A, and the needle directly over the ſame point, that it was when it was planted at A; and ſo ſcrew it faſt.

Your next work is to lay the fiducial edge to the point B, and direct the ſights to C, drawing a dry line towards it, and ſetting the diſtance BC meaſured by the chain from B to C.

In this manner you are to proceed, ſurrounding the cloſe till you come at laſt to A, where you begin, by planting the inſtrument at every angle, uſing the help of backſight and your needle, as at B, and then from the point repreſenting your preſent ſtation, directing the ſight to the next angle, as you did from B to C.

In the ſecond caſe, we do not plant the inſtrument at every angle, but at the more conſiderable, taking in the ſmaller by their perpendiculars from the baſe as we paſs along; of which the following figure may be an inſtance.

Fig. 30. Let ABCDEFGHIKL be a cloſe to be meaſured; by planting the inſtrument only at A C F and K, we have the main ſubſtance of the cloſe in the trapezium ACFK: and for the five ſmall triangles which muſt be added to the trapezium, they may be eaſily protracted by the help of ſuch a little ſquare as was formerly mentioned; for by finding at how many chains and links diſtance from A upon the ground, the perpendicular B *b* falleth upon the line AC; and having meaſured the length of that perpendicular, and taken in between the compaſs-points of the ſcale, we erect a perpendicular of that length at *b*, which is the point upon the paper, where ſo many chains and links determine, as were meaſured upon the ground, from the angels A, to the place where the perpendiculars fell on A *c*, viz. at *b*. Juſt in the ſame manner we raſe the perpendiculars D *d*, and G *g* I *i*; and then by the help of the perpendiculars, we draw the boundary lines AB, BC, CD, DE, FG, GH, HI, IL, KL. LA: which, together with the line EF between the angles E and F, give the true plot of the field in one lage trapezium, and five ſmall triangles ready for caſting up.

The third caſe is like the ſecond, ſo that there needs no new direction concerning it, but to annex one plain diagram; all the difference conſiſting in this, that becauſe we cannot go within it, being ſuppoſed to be ſome pool, bog, or thicket, we muſt of neceſſity go on the out-ſide, and conſequently all the triangles made by inward angles, and their lines upon the meaſured baſes, muſt be excluded, by the boundary-lines, from being any parts of the plot.

Fig. 31. Suppoſing ABCDEFGHIKLMNOP to be a great pool, though here be fifteen angles, plant your table only five times, viz. at A E F H and M, and upon the dry lines AE, FH, HM, and MA, raiſe their perpendiculars in their proper places, and alſo of a right height, by which, and the five ſtationary angles, we may draw the bounding-lines of the plot, excluding all the triangles as foreign to it, they being no reſemblances of any part of the pool, but of land adjacent.

Concerning the plotting of many cloſes together, whether the ground be even or uneven.

Though we do not deſign to make the reader able to ſurvey lordſhips and foreſts, much leſs to draw maps of countries, but to meaſure a parcel of land with truth and judgment, yet we would have him ſo expert, as not to be puzzled, if any ſhould deſire him to draw a true map of a tenement or ſmall demeſne, conſiſting of ſeveral cloſes; for which purpoſe, let him obſerve the following method.

Fig. 32. Suppoſe ABCDEFGHIKLM to be a tenement or ſmall demeſne, divided into fourteen cloſes, to be meaſured and protracted according to their ſeveral ſhapes and ſituation, firſt draw the plot of the whole by the method of circulation, planting your inſtrument either at every angle, or only at the moſt conſiderable either within or without, as you find moſt convenient. This being done, a line from B to M, gives the triangle ABM from the firſt cloſe. In the next place go round the ſecond cloſe beginning at M, then to B, and ſo about to M again: and then for the third cloſe, plant your table at C, and go round to

to B, the line B C being protracted already, and ſo of all the reſt, ſtill obſerving which are common lines belonging to ſeveral cloſes, repreſenting the fences, that you may avoid the trouble of meaſuring thoſe lines oftener than once, and lay every part of every cloſe in its due place; and be ſure to keep the inſtrument throughout the whole work to its true poſition by needle, fore-ſight, and back-ſight.

There are divers other ways of doing this work, but none more ſure or plain, eſpecially if the ground be uneven; for in that caſe, if you protract according to the length of lines meaſured from your ſtation to the angles, you will put your cloſes into unproportionable ſhapes, except you reduce hypothenuſal lines to horizontal, by inſtruments, or otherwiſe, which is ſomewhat troubleſome; and the like may be ſaid when you plot with the chain only. Indeed the method of meaſuring only the ſtationary diſtances were very proper for ſetting out the figure of each particular cloſe, provided the diſtance of the ſtations be large, and taken, if poſſible, upon pretty even ground, which ſometimes may be done, though moſt of the cloſe be uneven; and the work ſo ordered, as not to make too accute angels; but becauſe this requires ſkill and care, we adviſe the young artiſt to uſe the circling way, as generally moſt commodious.

It is convenient when you plant your table, that the needle hang juſt over the north point of the compaſs under it in the box; then may you by the lines overthwart the frame of the table, eaſily draw two lines quite through the plot, cutting one another at right angels, the one pointing at north and ſouth, and the other at eaſt and weſt. And if you mark the two and thirty points of the compaſs upon the place where they interſect, and draw the forms of the houſes, woods, and other remarkable things upon the demeſne, and the courſe of brooks and rivers running through it, it will add to your commendation.

And ſo it will alſo, if you take in ſuch parcels of land bounding it, whether common or peculiar to other men, as will make your plot look handſomely, like a perfect ſquare or obling. But however that be, you muſt be ſure to protract truly all lanes going into it, or trough it, and all cloſes of other men's mixed with it; and alſo all conſiderable ponds, ways, and out-lets, with the names of the cloſes, and quality of the ground, whether meadow, paſture, arrable, &c.

Concerning ſhifting of paper.

In work of this kind, it ſometimes happens through the multitude and largeneſs of fields, that one ſheet will not hold your whole plot; in which caſe you may help yourſelf by ſhifting paper, as we call it, thus.

Fig. 33. Let A B C D repreſent the ſheet of paper that covers the table, upon which the plot of the large piece of land E F G H I K ſhould be drawn: having finiſhed your firſt ſtation at E, and the ſecond at F, and find your paper will not receive the line F G, draw it ſo far as it will go to the edge of the paper, and planting your table again at E, proceed in your circulation the contrary way to K and I, where you will find yourſelf again at a loſs for your line I H, but draw it alſo to the edge of the paper; then with the point of your compaſſes ſtriking the line P O parallel to the edge of the paper B C, and the line Q O parallel to D C, and cutting P O in O, throw it aſide for a while, covering the inſtrument with a new one, which mark with the figure (2) for your ſecond ſheet.

Fig. 34. Upon which ſecond ſheet, the leading part whereof is repreſented by the three lines meeting in the angular points, A and B, draw P O parallel to A B, the leading edge of the paper, and croſſing it at right angles in the point O, by a parallel to B C, viz. the line O R, being of the ſame diſtance from B C, that Q O in the former ſheet was from D C; then with a rule and a ſharp penknife cut off the end of the firſt ſheet at the line P O, and applying the edge of it to the line P O of the ſecond ſheet, ſo as it may touch that line all along, and the line Q O of the former touch the line O R in the latter, ſo as to make one line with it, draw the lines P G, being the remainder of the line F G, and the line O H, being the remainder of the line I H, and from their extremities the line G H. And if the plot required it, you might proceed on in the ſecond ſheet, and annex a third and a fourth, &c. as there is occaſion.

Theſe ſheets may be pieced together with mouth-glew or fine paſte, applying the edge of the former as you did upon the table, to the line P O of the latter.

And note here once for all, that when we ſpeak of applying the edge of the paper to a line, we mean the preciſe edge cut by the line P O; but when we ſpeak of drawing lines to the edge of the paper upon the table, we hope none will think us ſo abſurd as to mean the edge that is concealed under the frame, but that the meaning is, that the lines muſt be continued on the paper till they touch the frame.

Concerning the plotting of a town-field, where the ſeveral lands, butts, or doles, are very crooked: with a note concerning hypothenuſal, or ſloping boundaries.

Fig. 35. Suppoſe A B C D E divided, in the manner of a common field, into ſeven parts or doles, belonging to ſeven ſeveral men: firſt, plot the whole, as before hath been taught, then meaſuring from A to B upon the land, note down, as you go along, at how many chains or links, or both, the diviſion is between dole and dole, and accordingly mark them out by the help of ſcale and compaſſes in the line A B on the paper-plot. In the very ſame manner you muſt meaſure and mark out the lines O C and E D; which being done, take the paper from the inſtrument, and laying it before you on a table, with the ſide A E towards you, the compaſſes muſt be ſo opened and placed, as by a few trials they may, that one foot reſting upon the table, the other may paſs through the points of diviſion upon all the three lines, viz. A B, O C, and E D, as in this figure they do.

If the content of any one or more of theſe parts, butts, or doles, be deſired without plotting, it may eaſily be done, without your plain table, thus: take the breadth by your chain at the head, middle, and lower end, and adding theſe numbers together, the third part of their ſum is the equated breath; by which multiplying the length meaſured down the ridge, or middle, the product gives the content.

But both in this caſe, and that mentioned before, the figure of a plot may be ſomewhat diſordered, not only by the unevenneſs of the ground within, but alſo by the great declivity of the ground where the boundary lines go, either of the whole plot, or particular parcels. For whereas in plotting, every line is preſumed to be horizontal, or level that it may paſs from angle to angle the ſhorteſt way. and that every

part may be duly ſituated, and none thruſt another out of its right place, if it be not level, but falling down towards a valley, or riſing up hill, or compounded of both, a line over ſuch ground, will be falſe as to the plot, and therefore muſt be reduced to a level, and ſo taken off the ſcale, and protracted. For the doing of this, there are ſeveral inſtruments very proper, eſpecially Mr. Rathburn's quadrant upon the head of his peracter, and divers others. But ſuppoſe our country friend to have no other but ſuch as we have already deſcribed, we ſhall ſhew him a plain eaſy way much uſed by practical ſurveyors.

Fig. 36. Suppoſe A B C to be a part of a hill falling within your plot, your boundary line going crookedly from A to B, following the ſurface of the ground. To find the horizontal line, equal to A C, cauſe one to ſtand at the point A, the foot of the hill, and to hold up the end of the chain to a convenient height, and gently aſcending the hill, you muſt draw it level, and make a mark where it toucheth the hill, obſerving the number of links betwixt your aſſiſtant's hand, and that place where he muſt take his ſecond ſtanding, and hold it up as before, and ſo draw it out level again, till it touch the place where he muſt take his third ſtanding, noting the links as before, and ſo proceed, till at laſt, from his fifth ſtanding, you draw the chain level to the higheſt point within your plot, viz. the point B. And now as the pricked lines of this figure put together are evidently equal to the line A C, ſo are the links noted down at every ſtation, when ſummed up, equal to the horizontal line of that part of the hill.

In the very ſame manner, only inverting the order, you may find the horizontal lines going down hill, where that is moſt convenient: and if there be both aſcents and deſcents in one line betwixt two angles, the horizontal lines of both muſt be found and joined together in protraction.

All this concerning declivities of riſing or falling ground, is to be underſtood when they are conſiderable, and a very exact plot required; for ſmall ones, eſpecially when much exactneſs is not expected, are not regardable.

Concerning plotting a piece of ground by the degrees upon the frame of the plain table ſeveral ways, and protracting the ſame.

Hitherto we have ſhewn the uſe of the plain table as ſuch, and our directions have been near as plain as the inſtrument itſelf. We will now ſhew how the plot of a field may be taken by the degrees on the frame by two methods, whereof the one is proper for an ordinary cloſe, where all the angles may be ſeen from one ſtation within it, the other ſitting any parcel of land, tho' much larger, whatever be the figure of it.

For the former, take this example.

Fig. 37. Let A B C D E repreſent the figure of a field to be plotted by the plain table in rainy weather, put on the frame without a paper, the graduated ſide upwards, and plant it in ſome convenient place, whence you can ſee all the angles, as at O; then placing the index upon the table, ſo as the fiducial edge may, at the ſame time, go through the center upon the table, and the lines upon the frame of the table cutting it perpendicularly at 360, where the degrees begin and end, and 180, the exact half, turn about the table upon the ſtaff-head, till through the ſights, the ſide marked with 180 being next your eye, ſee the angle A, and then ſcrew it faſt, obſerving where the needle cutteth, and by back ſight cauſing a mark to be ſet up in the line C D at the point F, that the inſtrument may be kept firm from moving, or be rectified if it be moved during the work. And now the line A O F paſſing upon the land from the angle A, directly under the ſights of the inſtrument to the mark at F, is, as it were, the prime diameter whence the degrees of the angles are to be numbered, and accordingly you muſt mark the angle A in the table hereafter to be exemplified with 360 degrees. Then turning the index with the fiducial edge upon the center, till you ſee the thread cutting the mark at B, the ſaid edge will cut upon the frame at 76 deg. 15 min. which note down for that angle. The like muſt be done, turning the ſight to C D and D, but not to F, for there is no angle, but only a mark in the boundary, and you will find the index to cut for every angle as we have marked them within the pricked circle of the laſt figure, viz. 157 deg. 35 min. for C, 225 deg. 20 min. for D. and 278 deg. and 50 min. for E.

Then meaſure, or cauſe to be ſtrictly meaſured by others, the diſtances betwixt the place where the inſtrument ſtands, and every angle, and you will find them to be as ſet down upon the pricked lines in the little circle, viz. A 4 chains 20 links, B 4 chains 3 links, C 3 chains 84 links, D 5 chains 35 links, E 5 chains 6 links. And now your table both for lines and angles is thus perfected, and the work is ready for protraction within doors.

	D	M	C	L
A	360	00	4	20
B	76	15	4	03
C	157	35	3	84
D	225	20	5	35
E	278	50	6	06

Your judgment will eaſily inform you, that in ſuch weather we ſhall hardly ſtand to make our table neat and formal, but any thing, how rude ſoever, that we can underſtand, doth the feat. A Welſh ſlate with a ſharp ſtile, or for want thereof, a black-lead pen, and a ſmooth end of an hard board like a trencher, is more convenient at ſuch a ſeaſon, than pen, ink, and paper. But of all, we would commend for expedition a red-lead pen, whereby you may mark out every angle neatly with one touch upon the table itſelf, juſt where it toucheth the frame by help of the fiducial edge, and cloſe by it the length of the line from the center to that angle: all which may be eaſily cleared off by a wet ſpunge or cloth ſo ſoon as you have protracted.

Fig. 37. Now to protract our obſervation; draw upon a paper the line A F at adventure, ſo it be long enough, and ſtick a pin in it at pleaſure for the center O, upon which place the center of the protractor, ſo as the ſtraight ſide may juſt lie upon the line A F, the limb or arch-ſide being upwards towards B; by help whereof make a prick or point on the paper 76 degrees 15 minutes for B, and at 157 degrees 35 minutes for C, according to the number neareſt to the limb.

Then turning the protractor about on the pin with the arch or limb down towards D and E, till the diameter lie again juſt upon the line A F, number downwards from the right hand towards the left, by that rank of figures that are nearer to the center, beginning 190, 200, &c. and over againſt the places where 225 degrees 20 minutes and 278 degrees 50 minutes fall, prick the paper at the ſide of the limb, and through thoſe four points draw ſo many ſeveral lines, upon which, and alſo upon the line A O, mark

mark out by what points the true meaſure of every line, by a ſcale, from the center, and from thoſe points drawing the lines A B, B C, C D, D E, and E A, you have the true plot of the field.

Having proceeded in the field as before, and made your table for lines and angles, or done that which is equivalent by a red-lead pen, draw the line A F, and having extended the compaſſes to the radius, or 60 degrees, on a line of chords, ſet one foot towards the middle of the line A F, and with the other deſcribe a circle like that in this figure of a five angled field, but much larger, according to the length of the radius: then extending the compaſſes from the beginning of the line to 76 degrees 15 minutes, ſet one foot in the interſection of the circle by the line A, and with the other foot make a mark in the circumference of the circle upwards, towards the right hand, and through it draw the dry line B O.

In the next place ſubſtract the angle 76.15 from 157.35, where the index cut for the angle C, and there remains 81 degrees 20 minutes, which take off the line as before, and ſet it upon the circumference from the interſection by B O, toward the end of the diameter marked with F, and through the point where it falls, draw the dry line C O.

In like manner ſubſtract 157 degrees 35 minutes from 225 degrees 20 minutes, and the difference is 67 degrees 45 minutes, which ſet from the interſection by the line C O, downwards paſt the prime diameter A F, and through the point where it falleth, draw the line D O.

Laſtly, having ſubſtracted 225 degrees 20 minutes from 278 degrees 50 minutes, there remains 53 degrees 30 minutes, which muſt be ſet downward towards the left-hand from the interſection by D O; and through the point where that falleth, draw the line E O. And now having ſet the particular meaſures upon every line, and drawn the boundary lines, as you muſt have done if you had uſed a protractor, the plot is finiſhed.

But for better aſſurance that you have done your work well, take the meaſure of the remaining angle A O E upon its proper arch, viz. from the interſection of the circumference by A F, to the interſection by E O, and applying it to the line of chords, you will find it to be 81 degrees 10 minutes, as it ought to be, for it ſhould be the complement of 276 degrees 50 minutes to 360.

And for farther ſatisfaction, ſum up the degrees and minutes of all the five angels, which for plainneſs-ſake we have noted in every one of them on the out-ſide of the circle in the figure ſo often referred to, and their ſum is 360, as it ought to be.	76. 15 81. 20 67. 45 53. 30 81. 10
	360.000

The reader may now expect that we ſhould teach him how to take a plot at two or more ſtations, when all the angels cannot be ſeen from one: but becauſe this is ſo eaſy from the principles already laid down, to any that is ingenious, and in part rendered unneceſſary by the method preſently following, we ſhall only give this general hint.

When you have from one ſtation taken in all the angles you can ſee from thence, and then are to remove to your ſecond ſtation, do juſt as you would do if the table were covered with a paper; only it is at your choice, whether you would guide yourſelf for back-ſight by a line that may be rubbed off, drawn upon the table itſelf, from the center to the degrees, on the frame along the fiducial edge, or by noting only what degrees it cuts on either ſide of the center, the edge paſſing through it, that by the help thereof and the needle, the inſtrument may be placed in the ſame line and ſituation as before, for taking in the reſt of the angles, if it can be; if not, another ſtation muſt be taken after the ſame manner.

Fig. 38. Let A B C D E be the figure of a field to be plotted, the weather being bad; ſend your aſſiſtants to find the length of every ſide beginning at A, who return you ſuch an account of every ſide, in chains and links, as are noted upon the figure, and in the table following, viz. A B 3 chains 73 links, B C 4 chains 91 links, &c. In the mean time you are to find the angles; in order to which plant the inſtrument at B, and laying the index on the center look at C, and find the index cutting 10 degrees 15 minutes, and looking at A, it cuts 126 degrees 45 minutes; out of which if you ſubſtract 10 degrees 15 minutes, there remains 116 degrees 30 minutes for the angle A; but becauſe it will not be ſo convenient to ſubſtract there, you may ſet them down thus:

B A 126. 45
B C 10. 15

the meaning whereof is, that B notes the angle, and C A the lines meeting there, cutting ſuch degrees on the frame; and the reaſon why A is ſet above, is for more ready ſubſtracting afterwards; then removing to the angle C, and thence looking at B and D, you will find the index is cut as it is here expreſſed,

C B 153. 10.
C D 15. 40.

In like manner at D thus,

D C 96. 05.
D E 28. 50.

At E thus,

E D 141. 20.
E A 11. 45.

And laſtly, at A thus,

A E 98. 30
A B 9. 20

This being done, you may retire under covert, and by ſubſtraction find 116 degrees 30 minutes for the angle B, 137 degrees 30 minutes for C, 67 degrees 15 minutes for D, 129 degrees 35 minutes for E, and 89 degrees 10 minutes for A, as you will find them on the figure, and in this table, together with the length of the lines.

An.	D.	M.	Side.	Ch.	L.
A	89	10	A B	3	73
B	116	30	B C	1	91
C	137	30	C D	4	88
D	67	15	D E	9	64
E	129	35	E F	2	29

Note, that there is a way to find the angles without ſubſtraction, if at every ſtation you lay the fiducial edge over the center, and the diviſions 180 and 360, turning about the head of the inſtrument upon the ſtaff, till through the ſights you ſee one of the neighbouring angles, for the index turned upon the center to the other angle, will give you the quantity of the angle you are at, but this exact planting at every angle is more tedious than the other, and therefore not ſo fit for wet weather. But now to protract this plot:

Firſt, by your ſcale, rule, and compaſſes, draw the line A B in length 3 chains 73 links, ending at the point B; then laying the center of your protractor upon the line A B, ſo as the center of it be upon the point A, and that end of the diameter from which the numbers are reckoned on the arch or limb towards B, make a point for the angle A at 89 degrees 10 minutes, by the direction whereof, and

the

the point A, draw the line A E, which according to your ſcale, muſt be two chains 29 links.

In like manner placing the diameter upon A E, juſt as it was upon A B, and the center upon the point E, mark out by the limb, for the angle E, 129 degrees 20 minutes, by which draw the line E D, 6 chains 64 links.

In the next place, bring the center of the protractor to the point D; its diameter lying on the line E D, and its limb towards A, by which prick out 67 degrees 15 minutes for the angle at D, and draw the line 1 chain 88 links.

Laſtly, The center being at C and the diameter upon the line D C, in ſuch manner as before at other angles, prick out by the limb or arch 137 degrees 30 minutes, and draw the line C B, for at B your plot ſhould cloſe; and if rightly done, the angle at B will be 116 degrees 30 minutes, and the ſide BC 4 chains 91 links, which you will find it to be by meaſure.

But if you plot by a line of chords, you are not bound to this order, but may go from A to B, and ſo round that way if you pleaſe, which you could not ſo well do with a protractor, without reckoning the numbers backward, yet it muſt be granted that a line of chords neither doth the work ſo quickly nor conveniently: this is the way.

When you have drawn the line A B of a proper length, ſet the compaſſes to the radius, and placing one foot of the compaſſes in the point B, and with the other deſcribe an arch of a competent length, beginning at that ſide of the line A B that is deſigned not to be the inward ſide, and upon this arch, 116 degrees 30 minutes muſt be ſet; but becauſe the line of chords give only 90, ſet them firſt on from the line A B, and then take off the remainder 26 degrees 30 minutes, joining them to the 90 upon the arch, making a point, through which the line B muſt be drawn of a due length. In the like manner you muſt do at C E, but the angles at A and D need no ſuch piecing, being capable of being meaſured out by a line of chords at once.

Nor do your angels only give you trouble in this kind of work but your lines alſo will be often found too ſhort to receive the touch of an arch upon the radius, eſpecially if the line of chords be large, and your ſcale little; and ſo it may often fall out when you uſe the protractor upon ſuch ſhort lines as A E ad C D of this laſt figure: in which caſe a rule muſt be applied to them, and they muſt be extended to a due length, that the arches may meet them without the figure. And if thoſe extenſions of lines, and deſcribing of arches, ſpoil the beauty of your plot, the matter is not great, it is ſo eaſy to be retrieved; for if you lay on a clean paper, and prick through every angle, lines drawn between thoſe points, will give you the plot neat and perfect.

The artiſt ſometimes loſeth his labour of protraction through ſome error in the field, ſo that his plot will not cloſe; it is therefore proper to know before you begin that work, whether it will or no; for which purpoſe if we take a number leſs by two than the number of angles in the plot, and thereby multiply 180, that product being found to be equal to all the angles, the plot will cloſe, this appears by our plot in the preſent work; the multiplier being 3, becauſe the angles are 5, and the multiplier muſt be two leſs than the number of angles.

	Deg. Min.
180	89 . 10
3	116 . 30
	137 . 30
540	67 . 15
	129 . 35
	540

This kind of trial is grouded upon two principles of Euclid and Ramus, mentioned in the beginning of this article, ſhewing that in all plain triangles, all the angels taken together are equal to two right angles, and that the ſides, conſequently the angle alſo, of every triangle figure, are more by two than the triangles of which it conſiſteth.

Concerning taking inacceſſible diſtances by the plain table, and acceſſible altitudes by the protractor.

Fig. 39. The ſubſtance of what is to be ſaid for the firſt of theſe, is gathered from the inſtructions given for plotting a field, by meaſuring only the ſtationary diſtance; but to make the caſe more plain to an ordinary capacity, ſuppoſe the line A C to be the unknown breadth of a river, over which a bridge of boats is to be laid, and the general, that he may inform himſelf what ſtore of boats and planks is neceſſary to be brought down, commands you to tell him the true diſtance from A, where he is at preſent, to C, a little boat-houſe on the other ſide the water.

To ſatisfy his demand, plant your table covered with a paper at A, cauſing one to ſet up a mark at B, at a good diſtance from you, along the bank of the river, the farther the better, if diſtance do not hinder ſight: then having choſen a point to repreſent A, and laid the fiducial edge upon it, direct your ſights towards C and B, and ſtrike lines towards them. Which done, ſet up a mark at A, and from thence meaſure to B, 6 chains 32 links, and ſo plant your inſtrument at B, laying the fiducial edge to the line A B, and turning about the head of the inſtrument upon the ſtaff, till through the ſights you ſee the mark at A, and then ſcrew it faſt.

In the laſt place take 6 chains 32 links off your ſcale, and ſet it on the line A B, from A to B, and laying the fiducial edge to the point B, from thence direct the ſights to C, and draw the line B C, meeting or cutting the lines A C in C; ſo ſhall the ſpace A C meaſured on the ſcales viz. 8 chains 29 links, be the diſtance deſired, and becauſe the chain is 22 yards long, if you multiply 8.29 by 22, the product is 182 yards and $\frac{38}{100}$ of a yard, which by reduction is ſome little more than 13 inches and $\frac{3}{5}$ of an inch.

Now, to take the height of a tree, tower, or ſteeple by a protractor, without any arithmetical operation, hang a plummet with a fine ſilk thread at the center of it, and hold it ſteadfaſtly with that end to your eye, where the numbers begin, then look ſtrait along the diameter, ſtill removing backward and forward as there is occaſion, till you ſee the top of the tree, tower, or ſteeple, and the thread at the ſame time fall upon 45 degrees, ſo ſhall the diſtance from your eye to the tree, tower, or ſteeple, meaſured in an horizontal or level line, together with the height of your eye above the bottom of it, be equal to the height of the object.

If

If either for convenience of ſight, or any other reaſon, you think proper to ſet the other end of the diameter to your eye, then the thread for the above trial muſt fall upon 135 deg. inſtead of 45.

Of caſting up the content of land by a table.

Links	R.	P.
100000	4	00
90000	3	24
80000	3	08
70000	2	32
60000	2	16
50000	2	00
40000	1	24
30000	1	08
20000	0	32
10000	0	16
8750	0	14
8125	0	13
7500	0	12
6875	0	11
6250	0	10
5625	0	09
5000	0	08
4375	0	07
3750	0	06
3125	0	05
2500	0	04
1875	0	03
1250	0	02
625	0	01

This table conſiſts of three columns, the firſt containing links, the ſecond roods, or quarters of acres, the third perches; and the uſe of it is thus:

Suppoſe a field to be 7 chains and 25 links long, and five chains 50 links broad, theſe by multiplication make 398750, whereof 5 figures being cut off towards the right hand, the figure 3 ſignifies acres, and the reſt, viz, 98750 denote parts; and to reduce them into roods and perches, firſt ſubſtract from 98750 the greateſt number of links in the table that can be ſubſtracted from it, viz. 90000, and put down for it three roods 24 perches, which you find over againſt it in the annexed colums, and the remainder being 8750, look in the table, and find over againſt it 14 perches, which by addition makes 3 roods 38 perches; ſo is the whole content of the field 3 acres, 3 roods, 38 perches.

7.25	
5.50	
36250	
3625	
3625	
3.98750	
A R P	
3 3 24	
14	
3 3 38	

But note here, that if the remainder after the firſt ſubſtraction cannot be found in the table, you may take the neareſt to it, ſo the error will be but part of a perch.

As for example.

7.75 being the half perpendicular, and 9.23 the baſe, give for their product 6.78405. The 6 ſignifies acres, and from the reſt 70000 being ſubducted, to which 2 roods 32 perches anſwer, there reſteth 8405; which, becauſe you cannot find in the table, you muſt take the neareſt, which is 8125, to which 13 perches anſwer; ſo the whole content of that triangular cloſe, is 6 acres, 3 roods, and 5 ſquare perches, and a little better.

A R P
6 2 32
13
6 3 05

SUSSINGLE, or *Surſingle*, the girt which comes over the ſaddle, and binds it firmly to the horſe.

SWAMP, a hollow, watery place, in any part of a field; a bog. *See* BOG.

SWANG, a freſh piece of green ſward lying in a bottom among arable or barren land.

SWARD, the ſurface of the ground.

SWARM, a large number of bees, ſeeking a proper ſettlement. *See the article* BEE.

SWATH, or *Swarth*, a line of graſs, &c. cut down by the mower.

SWATH-BAUK, a ſwarth, or line of new mown graſs or corn.

SWATH-RAKE, a rake about two yards long, with iron teeth, and a bearer in the middle, to which a man fixes himſelf with a belt, and when he has gathered as much as his rake will hold, he raiſes it and begins again. This inſtrument is in ſome counties called a dow-rake, and much uſed in Eſſex for gathering barley after mowing.

To SWEAL, to ſinge, or burn off the hair, &c.

SWILL, a veſſel to waſh in ſtanding on three feet.

SWINE. *See the article* HOG.

SWINE-CRUE, a hog's-ſty.

SWINE-HERD, a keeper of ſwine.

SWINHULL, a hog's-ſty.

SYCAMORE, the name of a tree well known in many parts of England. It grows to a large ſize; the wood is ſoft and very white, and therefore valued by the turners; but is not eſteemed very valuable for other purpoſes. However, as this tree will thrive better than moſt other ſorts near the ſea, it is frequently cultivated to ſcreen plantations of other ſorts of trees from the ſpray of the ſea.

SYTHE. *See* SCYTHE.

T.

TEA

TABERN, a cellar.

TAGGE, a ſheep of the firſt year.

TAIL-SOAKED, a diſeaſe incident to cows, by which the joint of the tail near the rump, will, as it were, rot away. The cure is generally performed by cutting a deep gaſh into the part affected, then rubbing a handful of ſalt into the wound, and binding it up with a rag. Others mix ſoot and a clove of garlick with the ſalt.

Wild TANSEY. *See the article* SILVER-WEED.

TARES. *See the article* VETCHES.

TEAM, a number of horſes or oxen drawing at once the ſame carriage.

To TEAM, to pour or lade out of one veſſel into another.

TEAZLE, or *Fuller's Thiſtle*, a ſpecies of the thiſtle cultivated for the uſe of clothiers, who dreſs their cloth with them.

The teazle is propagated by ſowing the ſeeds in March, upon a dry ſoil. About one peck of the ſeed will ſow an acre; for the plants ſhould have room to grow, otherwiſe the heads will not be ſo large, nor in ſo great quantity. When the plants are come up, you muſt hoe them in the ſame manner as is practiſed for turnips, cutting down all the weeds, and ſingling out the plants to about ſix or eight inches diſtance; and as the plants advance, and the weeds grow again, you muſt hoe them a ſecond time, cutting out the plants to a wider diſtance; for they ſhould be, at laſt, left at leaſt a foot aſunder; and you ſhould be particularly careful to clear them from weeds, eſpecially the firſt ſummer; for when the plants have ſpread ſo as to cover the ſurface of the ground, the weeds will not ſo readily grow between them. The ſecond year after ſowing, the plants will ſhoot up heads, which will be fit to cut about the beginning of Auguſt; at which time they ſhould be cut and tied up in bunches, ſetting them in the ſun, if the weather be fair; but if not, they muſt be ſet in rooms, to dry. The common produce is about an hundred and ſixty bundles, or ſtaves, upon an acre, and they will ſell for about one ſhilling a ſtave. *Miller's Gard. Dict.*

M. de Chateauvieux extended the New Huſbandry even to the culture of the teazle, or fuller's thiſtle, which grew to a ſurpriſing height, and produced an extraordinary number of the fineſt and beſt heads that the fullers in his country had ever ſeen.

"I am well informed, ſays an ingenious correſpondent of the editors of the Muſeum Ruſticum, that the principal place in the kingdom for the cultivation of the teazle, is about Wrington in Somerſetſhire, many of the inhabitants of that, and the neighbouring pariſhes, being chiefly employed therein; and from theſe places the cloth manufactories in the counties of Glouceſter, Somerſet, and Wilts, are ſupplied, and even a great many packs carried annually into Yorkſhire.

"The land moſt ſuitable for this plant is that of a thin, ſweet ſurface, and marly bottom, though a clay or ſtone-traſh bottom will do, and produce large crops: rich loam, or ſtrong clay, is very improper, as on them the plant is apt to grow luxuriant, and thereby cauſe the heads to be large and coarſe-hooked, and, in a moiſt ſummer, ſubject to mildew and rot before they bloſſom and are fit to cut.

"As to ſituation, a ſouthern aſpect, on the decline of a hill, is to be preferred, though any other will do; but upland ground is to be moſt eſteemed, more eſpecially in an encloſed country, that the wind may aſſiſt in carrying off the natural humidity of the plant in moiſt ſeaſons, which ſometimes, in low and ſmall encloſures, is retained ſo long as to cauſe the heads to taint, and become rotten.

"Having made choice of a piece of ground, (an old lay is preferable) in February cauſe it to be ploughed in ridges of three bouts each, at a depth ſuitable for a crop of beans, taking care that the furrows be laid ſtrait, and as even as may be; the middle of the ridge higheſt, and a freſh furrow ploughed in the furrow between each ridge; after which let a man go along each ridge, and with a mattock, hoe, or ſpade, raiſe earth in ſmall clods, at ſuitable diſtances from each other, to produce earth, when meliorated, to heal or cover the ſeed.

"Having done thus much, let it remain as it is until the time for ſowing the ſeed, which will be about a week or ten days in April, as then the earth is generally moiſtened with rain.

"At this time cauſe a middle-ſized harrow to be drawn over the land once or twice in a place, to fill the crevices between each furrow, and level the ſurface; after which ſow the ſeed broad-caſt, in the proportion of two buſhels on an acre; then harrow it in, the ſame as turnip ſeed, and let it remain until the plants are come up, and grown into ſix or eight leaves each; when ſome perſon or perſons ſhould go over the field with a hoe, and cut out the plants where they are too thick, to the ſize of about two feet from each other every way, if the ground be in heart; if it be thin poor land, ſixteen or eighteen inches diſtance is ſufficient.

"After

" After this they may remain until the latter end of Auguſt, when they muſt be gone over as before, with this difference, the perſon ſhould have a ſpade made about four inches broad, and eighteen inches long in the bit, or pan, with a tree in it of three feet ſix inches long: with this tool the workman muſt go backward, and turn the whole ſurface over, about two inches deep, in long ſpits, turning the ſpade from the plant, to turn the ſpit ſo as no earth may fall into the heart of the plant: but it would be adviſable, at the time of firſt ſizing the plants, to leave more than are neceſſary to ſtock the ground, to have ſome to fill up the vacancies where any may happen to die, which is often the caſe during the ſucceeding winter, and more eſpecially ſhould it prove froſty.

" Having done thus much, in this ſtate they are to remain during the winter; only care muſt be taken that no cattle get into the field, eſpecially ſheep, which will eat out the cabbage of the plant, and ſpoil it.

" About the latter end of the ſucceeding February, the plants ſhould be digged between as in Auguſt, being very careful that none of the earth falls into the middle of them; and in May, when the plants begin to ſhoot into ſpindle, the ground muſt be digged over again, with this difference, inſtead of being laid plain, it muſt be raiſed into ſmall hillocks about each plant, to ſtrengthen them in the ground, ſo that the wind may not blow them down when loaded with heads.

" This being done, they are left till the ſeaſon for cutting, which will be a work of ſome time, as the heads become fit, which is known by their blowing: it is to be obſerved that the bloſſom firſt appears near the bottom of the head in ſmall, pale, blue flowers; and when theſe appear to have blown ſomewhat more than half way up, ſuch head is fit for cutting, which is generally done in this manner; a man has a knife, the blade about two inches long, with a ſtring in the haft to put over the hand, and a pair of ſtrong gloves to defend him againſt the ſharp prickles on the ſtalks.

" Being thus equipped, he muſt go along each furrow, and cut with one hand putting them into the other, till he has as many as he can eaſily gripe; when cutting one which is a little more ripe than the others, and the ſtem about eighteen inches long, he binds the handful together with it, (the others are generally cut about nine inches long) which done, the handful is toſſed to ſome open ſpot, in order to be carried to the place for drying, which is done in the following manner.

" Some ſmall poles of aſh, willow, or any ſtrait-growing wood, about the ſize of a hedge-ſtake, and ten or twelve feet long, muſt be procured, at the great end of which, about eighteen inches from it, a hole muſt be made, and a peg put through, to extend three or four inches on each ſide. The poles thus prepared, the handfuls of teazels muſt be put on them, by running the ſmall end through the handful, until the pole be filled: in this condition they muſt be ſet on one end to dry; but it is to be obſerved, that they ſhould be carefully carried into a houſe or ſhed every night, and brought out at days; and in the houſe ſet ſo as for the poles not to touch each other, leſt they taint, which for want of a free circulation of air, they are very ſubject to, and more ſo if it be cloſe moiſt weather.

" When they are dry, ſo as to be free from moiſture, they may be carried into ſome upper room, and placed up cloſe together: over a cow-houſe, or place where cattle are fed in winter, is to be preferred, becauſe their breath is ſuppoſed to help to brighten them in colour: wherefore they are the better eſteemed, and ſuppoſed to be more tough in hook than otherways they would.

" When they have by this means acquired from the gradual moiſture of the air an additional elaſticity to the hooks, and are brightened in colour, which will be completed a little after Chriſtmas, the time that generally the heads are ſorted, and made out in the following manner. The handfuls are brought from the ſtorehouſe into ſome large room, uſually a barn-floor, where they are untied, one at a time; and generally made four ſorts of. The largeſt heads which are found, and are ſuch as grow on the middle ſtem of each branch, are thrown for the firſt ſort, and called kings. The next ſmalleſt which are found, and are commonly ſuch as grow as ſide heads on each branch, are thrown for a ſecond ſort, and are called middlings. Another, or third ſort, are ſuch of the largeſt, or thoſe which grew on the middle ſtem, as are damaged by the mildew, wet, or other accident; and which would have been kings, had not ſuch defect rendered them anworthy that appellation. Theſe therefore are thrown to a third ſort, and denominated ſcrubs. Theſe laſt, or fourth ſort, is the refuſe of all, and are ſuch as are too ſmall, or too much damaged for any uſe; and are therefore thrown away.

" When a quantity is thus ſeparated, they are made out in the following manner: the perſons who do it, put of the kings ten in each handful. Firſt, ſix of the larger, in the manner of a fan extended: and four leſſer of the ſame ſort, in the boſoms of the ſix; and then bind their ſtems together with a ſpleet of willow, or ſome tough wood, by wrapping it about them three or four times, and tucking the end under. When the kings are tied up in handfuls in this manner, a ſtrait ſtick of about three-fourths of an inch diameter, and two feet ſix inches long, is ſplit to within four inches of one end. Twenty-five of theſe handfuls are put on this ſtick, alternately head to ſtem; letting two of the middle ſtems of each handful to be in the cleft, to hold them ſecure; then a ſmall wreath, made of ſpleet, is ſlipped on the upper end of the ſtaff, which holds it together, and keeps the whole from falling about. In like manner are the ſcrubs, or third ſort, alſo made out and put in ſtaves. But of the middlings, or ſecond ſort, double the number of heads are put in one handful, by making two fan-like rows of ſix-each, and four in their boſoms on each ſide; and theſe are put into ſtaves of three feet long each, ſplit as the former, and thirty handfuls in each ſtaff. When they are thus made out, they are fit for ſale, and are to be laid by for that purpoſe in ſome convenient place, where they may not be bruiſed. Thirty ſtaves of the firſt and third ſort are accounted a pack; and forty ſtaves of middlings make alſo a pack.

" An acre of land, if well grown, and what is deemed a full crop, often produces nine packs of kings, nineteen of middlings, and two of ſcrubs. The common price per pack of the firſt ſort, is twenty, the ſecond ſort fourteen, and the third ſort eight ſhillings. But in a French war, they are generally double theſe prices.

The expence attending a crop per acre are,

	l.	s.	d.
1ſt, Rent of the ground for the crop, which is one year and a half	5	0	0
2d, Ploughing and ſowing.	0	15	0

3d, Firſt dreſſing or delving	1	0	0
4th, Second delving	0	10	0
5th, Hilling	0	15	0
6th, Cutting and carrying home	1	15	0
7th, Tythe	0	5	0
8th, Clearing off the ſtalks, and binding them in bundles	0	5	0
9th, Making out, at two ſhillings per pack, ſpleets, ſtaves, and wreaths included	3	0	0
All which make the total expence, attending one more acre of teazels	13	5	0

"This, excluſive of ſeed, which is not often bought, becauſe enough may be ſaved in making out the crop in winter: but if the ſeed be bought, it is generally valued equally with wheat. Therefore, if two buſhels be ſown on the acre, ten ſhillings may be added as the medium price; which makes the whole expence of one acre thirteen pounds fifteen ſhillings, if it ſhould produce thirty packs. But ſuch produce is not always the caſe, for twenty is to be eſteemed a middling crop.

"With reſpect to crops of corn, raiſed amongſt the plants, it is practiſed in many places; and indeed it has been mine to plant field beans, or garden beans, at about three feet diſtance ſingly from each other, in a promiſcuous manner over the teazel land: which crop of beans, by the cultivation neceſſary for the teazel, is greatly forwarded in growth, and often produces from four or five and ſix ſtalks from one bean, well loaded with cods. This crop is no injury to the teazel crop the firſt year, and frequently pays the expence of labour attending the whole.

"The crop, which generally ſucceeds the teazel, is wheat. The ground, by being frequently delved and kept clean, during the teazel crop, becomes very fit for this grain, and generally produces very large crops. Forty buſhels per acre is not uncommon, though the land in itſelf is often ſuch as is not annually worth more than ten ſhillings per acre. Hence, I think, it is evident, that a crop which well ſhades the ground, (in ſummer) and that has been two or three times turned and cleaned from all weeds, before ſuch ſhading, greatly fertilizes the land on which it grows. But I have frequently obſerved an error, to which the occupiers of ſuch land are too liable after theſe fertiliſing crops. This error is the ploughing away (by over-cropping) the profits which would enſue. If after its being thus fertilized by the crops of teazels, it were to be laid down with ſuitable artificial graſs-ſeed, ſown amongſt wheat and properly managed afterwards, it would I am experimentally ſenſible, be a laſting improvement." *Muſeum Ruſticum, vol.* III. *p.* 237, *and vol.* VI. *pag.* 1.

To TED, to ſpread abroad new mown graſs, which is the firſt thing done in order to its being dried, and made into hay.

TEDDER, *or* TETHER, a rope with which a horſe is tied in the field, that he may not paſture too wide.

To TEEM, to be pregnant; to engender young.

TENDRIL, the claſper of a vine, or other climbing plant.

TENEMENT, any thing, as a houſe, &c. held by a tenant.

TENURE, the manner in which tenants hold their lands, &c. of their lord.

THATCH, ſtraw laid on the top of a building, rick, &c. to keep out the weather.

THEAVE, or THIEF, an ewe of the firſt year.

THETCHES. *See the article* VETCHES.

THICKET, a cloſe knot, or tuft of trees; a cloſe wood.

THILL-HORSE, or THILLER, the laſt horſe in a team; the horſe that goes between the thills or ſhafts.

THISTLE, a well known prickly weed growing in corn-fields.

Wherever thiſtles grow naturally, it is a ſure ſign that the land is ſtrong: but they are, at the ſame time, a great annoyance to every plant intended to be cultivated. The beſt way to deſtroy thiſtles is to cut them up by the roots before their ſeeding time, which is in the autumn; for cutting of them too young, will only make them branch the more: or, which Mr. Liſle prefers, to pluck the thiſtles up by hand, when the ground is reaſonably moiſt before they are grown to the ſize at which they are uſually cut. They may then be eaſily drawn up with their root by the thumb and two fingers; and the weeder may guard againſt their prickles by putting on a glove, or falſe fingers, made of hard leather. Chalking of land is a good way to deſtroy this very noxious growth: but thorough tillage, ſummer fallows, and repeated good harrowings, are the moſt effectual of all.

By an excellent regulation in France, a farmer may ſue his neighbour who neglects to thiſtle his land at the proper ſeaſons, or may employ people to do it at the other's expence. And it were to be wiſhed, that a ſimilar law was enacted here, to prevent the wide-ſpreading miſchiefs occaſioned by the ſeeding of this pernicious weed; among which may be reckoned, beſides its choaking the young corn, that if wheat, in particular, be not well thiſtled, the reapers take up the grips ſo tenderly, leſt they ſhould prick themſelves, that, by their looſe handling of them, they ſometimes leave upon the ground corn enough to ſow the whole field.

THISTLING, the action of cutting or pulling up thiſtles, in order to deſtroy them.

THRASHING, the action of beating out the corn.

Though the flail be the beſt inſtrument yet known for threſhing the corn, becauſe it ſeparates the grain from the ſtraw and huſks very effectually and expeditiouſly; yet, as it always bruiſes a great many ſeeds, even ſo as to render them incapable of growing, it were much to be wiſhed that ſome method could be found, by which this eſſential inconvenience might be avoided. Some engine or other provided with a number of flails, or other pieces anſwering the ſame end, might ſurely be made to move by water, wind, or a horſe, ſo as to perform the buſineſs of threſhing ſtill cheaper and more expeditiouſly, and with leſs damage to the health of the huſbandman, which is frequently thought to be injured by the duſt, &c. which ariſes in the common way of threſhing, as well as by the very great laborioufneſs of the work. This well deſerves the attention and endeavours of ſkilful mechanics. At all events, the threſher ought not to wear thick iron-clouted ſhoes whilſt he is at work, eſpecially if he is to threſh new corn, and particularly wheat; becauſe they will be apt to bruiſe it. His ſhoes for this purpoſe ſhould be ſoled with an old hat, or ſome other ſoft ſubſtance.

Mr. Mortimer eſteems it a day's labour for a man to threſh four buſhels of wheat or rye, ſix buſhels of barley, five buſhels of oats, or five buſhels of beans and peas, if the corn threſh well. But Mr. Liſle ſays a good threſher aſſured him that twelve buſhels of oats or barley are reckoned

Fig. 1.

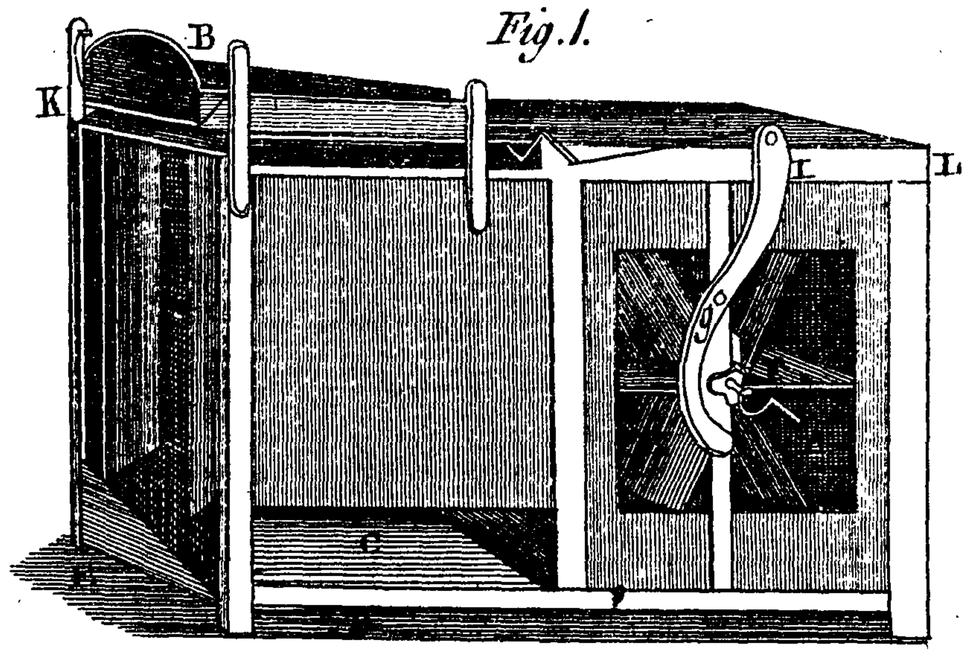


Fig. 2.

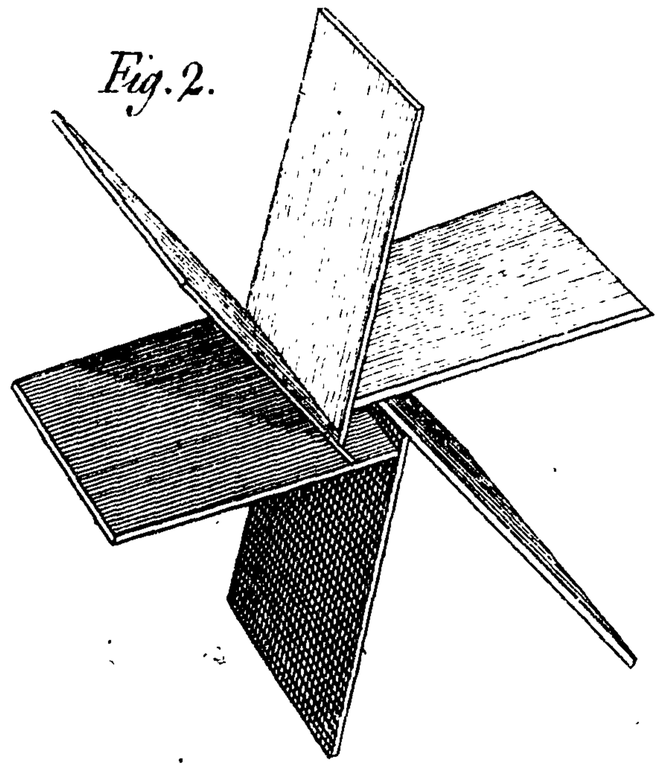
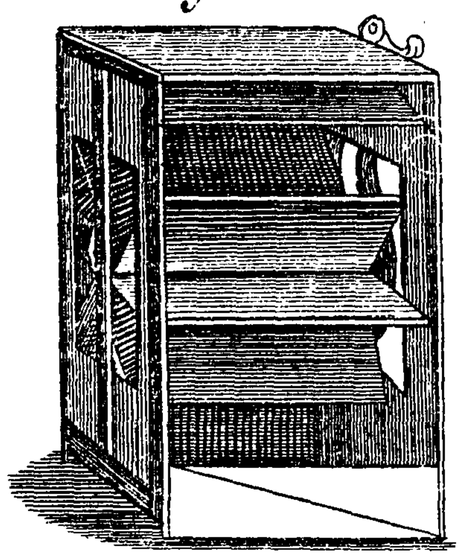
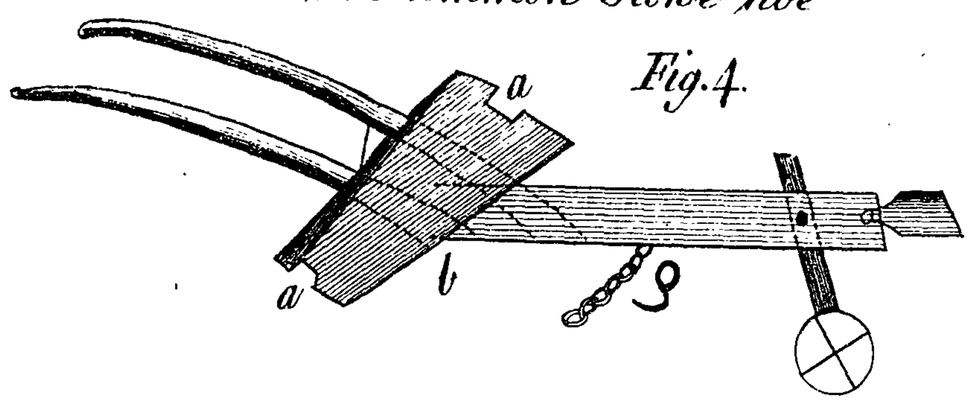


Fig. 3.



The common Horse hoe

Fig. 4.



Ventilators

Fig 7.

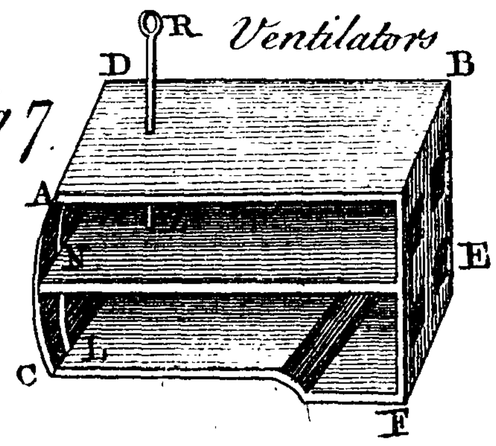


Fig. 9.

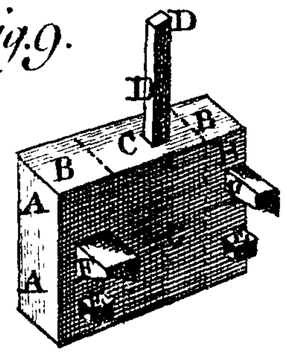
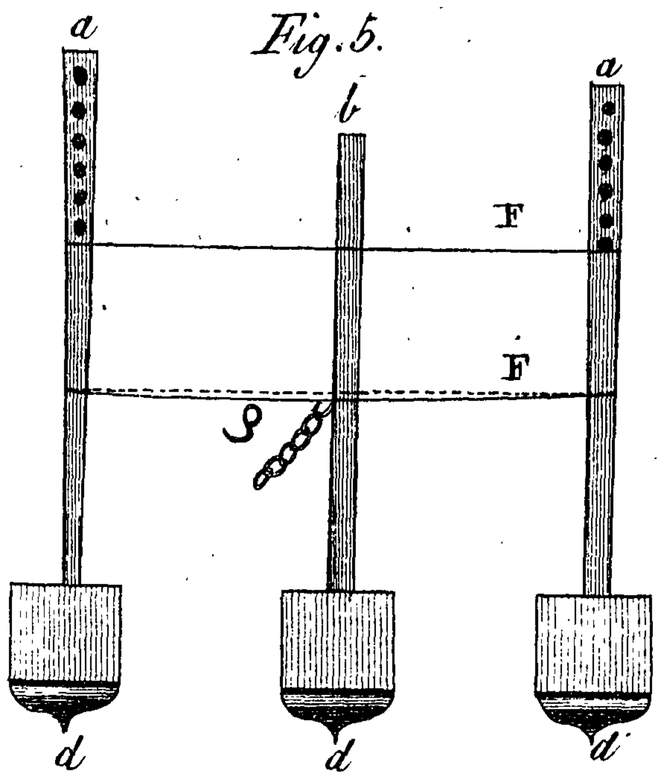


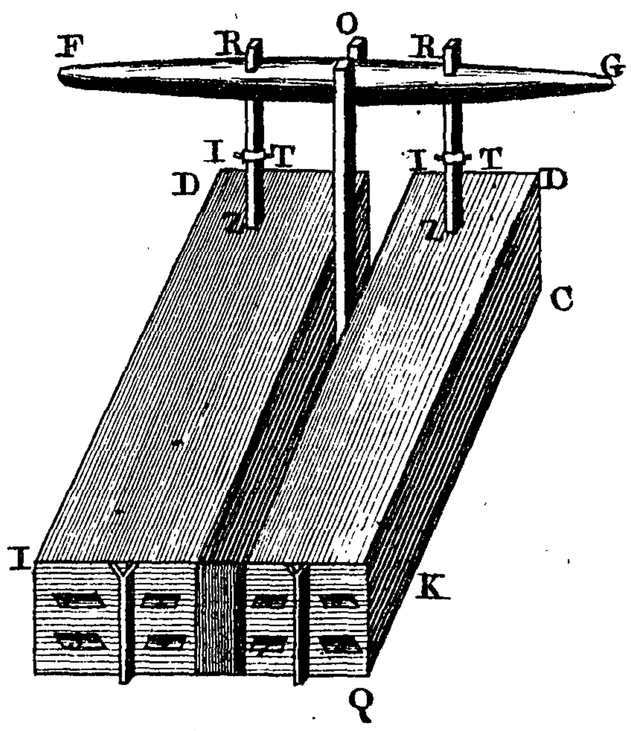
Fig. 5.



Turnep cabbage, Fig. 6.



Fig. 8.





ed a good day's threshing: that this very man had threshed fourteen bushels of oats daily, and winnowed them, for several days together; but that those oats yielded indeed extraordinary well: that five or six bushels of wheat are a very good day's threshing; and if the corn be clung, and yields ill, sometimes three bushels are as much as can be threshed in a day. He rates the common price of threshing at eight-pence for a quarter of corn; and observes, which may account for the difference between his estimate and Mr. Mortimer's, that six bushels of wheat of the growth of a warm gravelly vale are as easily threshed in a day, as four bushels of the produce of cold hilly land; because the stroke of the flail must be forced down stronger to beat out the grain of this last, than it need to be for the former: and also, that as the straw of corn of the growth of a light soil is shorter than that of a strong clayey ground, more sheaves, and consequently more ears of this first sort, may be laid together on a floor of equal extent, than can be of the last, whose longer straw requires proportionably more room.

The worse wheat is, though it be never so dry, the rougher it will feel when handled; because thin and coarse wheat is not so plump and globular as fine wheat, but is apt to be pitted and wrinkled, which of course renders it less slippery. It will handle cooler out of a stack two years old, than it will out of one that is only a year old; for in that time the mists and rimes, especially in a hilly country, will be driven into the stack.

Mr. Lisle, who makes this remark, adds from his own experience, that wheat threshed in damp weather generally yields but little flour, with a great deal of bran, when it is ground; and that if it be put into sacks, it will grow musty in less than three weeks, let the weather be ever so dry afterwards: but if it be threshed when the air is perfectly clear and dry, it will keep well in sacks, for a long time; especially if these are laid upon trestles high enough to secure them from the dampness of the ground or floor.

For the keeping of meal, in general, there is no better way than first to bolt it, and clear it from the bran, which is very apt to corrode and putrify it, and make it musty; then to tread it down as hard as possible, and head it up closely, in clean, dry, tight, and well bound casks, which must be laid in a cool dry place.

The beards of barley come off best, in threshing, when the swarths of this corn have taken the dew before their being housed. It will keep well in the mow, unthreshed, for one year; and for making it into malt, which must be done before the heat of the summer comes on, it should not be kept above a year and a half, or at most two years: otherwise it will be filled with weevils; unless it has been previously cured in a stove or kiln.

Oats, being defended with a double husk, are the grain least subject to harbour vermin. The best way to keep them after they are threshed, is to dry them well on a kiln, and then to barrel them up in clean close casks: but they should not be threshed earlier than Christmas, because they are not fit for keeping before that time.

Beans and peas alway thresh best after they have sweated in the mow, which they are very apt to do, because, as the whole crop of either of them never ripens all together, the green parts heat, and communicate their ferment to the whole heap. The danger to be guarded against here is, that the ripe so heated do not give fire to the green, by which both might be either rotted or consumed; to which the bigness of their leaves, and hardness of their stalks, which, continue moist and sappy a long time, will also contribute very much. For this reason farmers generally choose to stack them without doors, rather than to house them; that they may be the more thoroughly dried by the sun and air. But the best way of all is to kiln-dry them, or dry them well in the sun; after which they will keep many years, without turning or any other care, though they be laid ever so thick in the granary. As beans are a very large seed, and consequently full of moisture, it is found best to let those that are intended for keeping sweat in the mow till March, when they may be threshed without danger: for beans never give again, after they have once been thoroughly dried.

Peas are, of all grain, the most subject to rottenness and imperfection, because they are the most apt to breed worms, weevils, and mites, by reason of the lusciousness and sweetness of their grain. The better they are dried either in the kiln or sun, the former of which will generally be found most effectual in this country, the longer they will keep sound, and the fitter they will be for the food of cattle, by helping to make them thirsty; it being a just observation, that if cattle drink well, they will feed well. What is intended for the food of men should not be dried too much; because that would make the peas require double the time in boiling: nor need they be threshed for this use, but as they are wanted; or else they may be put into close casks, and headed up. In granaries, they keep best in thick heaps, or in bins; spreading of them thin upon the floor being apt to dry them too soon, and to take from them much of their sweetness and goodness.

Vetches wanted for sowing immediately after they are cut, may be threshed very well on a hurdle, with a cloth; though they may then be too soft, notwithstanding their being ripe, to be threshed on a floor, where the flail, and the thresher's feet, would bruise and break them.

When a careful husbandman opens and spreads his sheaves, he will pick out of them at least all the largest and most apparent weeds, before he begins to thresh. As he proceeds in his work, he will, from time to time, remove all the long straw from the corn beaten out of it, which last always lies underneath, with a prong or fork; and then the pieces of straw, broken ears, &c. with a wooden rake. He will then shovel the remaining grain up on one side of the floor, and repeat this till he has threshed out enough to make what is commonly called a clearing.

This heap is then passed through a wide sive, which retains only the bits of straw, and such fragments or ends of the ears as have escaped the flail. These frequently contain very good corn; though the farmer seldom grudges giving them to his poultry, or binding them up with straw intended for fodder. A few of them inclosed in a small truss bound at both ends, the better to keep them in, will entice horses to eat heartily of this straw, which affords them good nourishment: and M. Duhamel judges that they would also be excellent and profitable winter-food for sheep, when there is a scarcity of grass.

A great deal of labour may be saved in the using of this sive, by fastening a loop to its rim, and resting it thereby on a hook suspended by a rope. This will sustain half the weight of the corn, and the winnower may easily give it the necessary circular motion. But a yet more convenient method, is to place a square sieve, of wire is best, with thin boards for its sides, upon two polished rods of iron, to throw the corn up into it with a shovel, and to

ruſh it backward and forward upon theſe rods, on which it moves eaſily, and will ſift a great deal of corn in a ſhort time.

For ſeparating the chaff, which is the next buſineſs, the caſting-ſhovel is much more expeditious than either the wicker fan, or the common winnow with ſails. When this ſhovel is uſed, the wind muſt blow through the barn, either in at one door and out at the other, or in at a window, and out at the oppoſite door. The winnower then, placing himſelf under the wind, and cloſe to the heap of corn that is to be cleanſed, takes it up, one ſhovelful after another, and, with a circular motion, throws it ſcattered in the air, againſt the wind, towards the oppoſite ſide of the barn. The beſt grains, which are the heavieſt, go fartheſt; the leſſer fall ſhort of them; and the very ſmall, ſhrivelled, and much damaged, with the ſeeds of cockle, darnel, and ſeveral other weeds, fall ſtill nearer to the man who throws them; while the lighter ſeeds of other weeds, with the bits of ſtraw, chaff, duſt, &c. are blown from all the reſt, by the wind. From time to time, the winnower quits his ſhovel, and ſweeps away the ſecond ſized corn, which would be too much intermixed with the ſmalleſt, if the heap was left alone, and ſuffered to accumulate till the end of the winnowing; and when the whole is done, he ſhovels up the fineſt grain. The leaſt of all, which borders on the chaff, &c. is alſo then collected, and the three ſorts, after being ſifted or ſcreened, to cleanſe them from any remaining duſt, are laid up ſeparately; the firſt for ſale, the next for domeſtic uſes, and the third, if the farmer can afford it, chiefly for the food of poultry. The ſhort ſtraws and chaff are ſifted in a pretty fine ſieve, to clear them likewiſe of duſt, and are frequently given to oxen and cows.

Mr. Liſle obſerves that the ſeeds cannot be ſeparated from any grain by the common fan, but that it may be done with the ſcreen; of which he therefore adviſes the conſtant uſe for all ſorts of corn deſigned for ſowing.

Though wind is, in all caſes, the chief agent in the cleanſing of ſeeds, which being intrinſically heavier than their coats or huſks, are, by the ſame force applied to both, carried to different diſtances, in proportion to their weight, and thereby conſequently ſeparated; yet the natural action of this aſſiſtant is liable to many inconveniences: it blows not conſtantly; but frequently diſappoints the winnower in his time of greateſt need: when it does blow, it is not always in the beſt direction to anſwer the ſituation of his barn; and without doors it is intirely uſeleſs to his purpoſe, if it be not attended with fair weather. Beſides, when its force can be applied in the beſt way, it is even then not equal; but generally acts by ſudden blaſts, which, as is well known, diſorders the whole work, and occaſions a conſiderable waſte of ſeed.

The Dutch avoid theſe inconveniencies by uſing a machine (Plate XXVI. Fig. 1.) which creates an artificial wind, uniform and ſteady in its action, and always ready at command.

The fan, (Fig. 2.) which is the acting part of this engine, produces a wind proportioned to the velocity with which it is turned on its axis, and therefore capable of ſeveral degrees of ſtrength, as beſt ſuits the purpoſe of the winnower.

The fan is incloſed in a large caſe or box, K L, and occupies one half of it; which is repreſented ſeparately, and in a different view, in Fig. 3. It is ſuſpended freely on its axis, and turned by the handle A. The other half of the box is empty, and receives the ſeed as it falls down from the hopper B, to the ſloping floor viſible at C, along which it ſlides out at D, while the force of the wind which is confined within this winnow, and always acts in the ſame direction, viz. lengthways of the machine from A to E, carries the chaff, light and rotten grains, dirt, &c. out at E. In this paſſage, the wind meets the ſeed conſtantly falling from the hopper, and impels it more or leſs towards the end E, according to its weight. Good ſeed never goes quite ſo far, but comes down within the box.

The hopper here is ingeniouſly contrived to ſave labour. It hangs by ſtrings upon four pegs, and moves with ſuch eaſe, that the neceſſary motion may be communicated to it by the ſame hand that moves the fan, without any hindrance to the workman. To this purpoſe, a triangular board *f*, is fixed upon the handle of the fan, and turns with it. The angles of this board, in their rotation, preſs againſt the lower end of a little lath, incurvated as in the figure, which moves freely upon a peg at *g*. This end accordingly recedes from the preſſure towards H, and conſequently the upper end moves the contrary way, towards I, and by a ſtring faſtened from it to the hopper, draws this laſt after it, out of its natural ſituation. When this preſſure ends, and the ſides of the little triangle are next to the lath, the hopper hangs freely, returns to its former place, and takes the lath along with it, till the next angle of the little triangle begins to act; and ſo alternately as long as the fan moves. As the hopper is thus in continual motion, the ſeed ſheds down, and is winnowed as it falls.

The next care is to cleanſe the corn from all foreign bodies, which could not be carried off by the wind, ſuch as ſtones, bits of earth, &c. Theſe are ſeparated by running the grain through a ſive wide enough to let it paſs with eaſe, while bodies of a larger bulk are retained: and it is likewiſe often neceſſary afterwards to uſe a fine ſieve, which lets through only the duſt, ſeeds of weeds, and other bodies ſmaller than the corn.

As the farmers in many places feed their cattle, and particularly their ſheep, in the winter, with half-threſhed ſtraw; and as new ſtraw is good food for horſes, which are induced to eat it very readily when it ſtill contains ſome grain; there is, in this reſpect, an advantage in threſhing the corn only by degrees; beſides, that the grain itſelf is allowed to improve in its quality when preſerved in the ear, ſo as to attain the moſt perfect maturity, to ſweat out its moiſture, and to acquire a degree of hardneſs which fits it for long keeping. About three months after it has been cut, is generally reckoned the beſt time for threſhing wheat that is intended for keeping; and accordingly our prudent huſbandmen make this the buſineſs of winter, when their preſence is leaſt wanted in the field. But, on the other hand, ſeed wheat cannot well be too ſoon cleared from the chaff, as M. de Chateauvieux's experiments have proved; and the beſt way of doing this, is by ſtriking the ears againſt a beam. By this method the huſbandman will obtain fine, long, unbruiſed ſtraw, fit for binding up his next year's ſheaves, for thatching, and for various other uſeful purpoſes. Of this he ſhould always ſave, and ſtack, as much as he can ſpare, when it proves long and good; for wheat ſtraw will keep perfectly well a year or two; and if there be no occaſion for it in that time, it will make litter and dung at laſt. Barley ſtraw is likewiſe very ſerviceable for thatching or to throw over ſtacks of barley, or peas, till they can be thatched: but oat ſtraw is of no great uſe unleſs,

unleſs it be to cover an oat-rick, peas for fatting hogs, or corn for fowls. In general, an empty ſpace ſhould be left in the barn, if it can be done conveniently in harveſt time, to receive the litter, and foddering ſtraw, that is threſhed out before cattle come to fodder; or it ſhould be laid under ſome cover, for otherwiſe it will rot.

THRASHING-FLOOR, the floor on which the corn is thraſhed. *See the article* BARN.

THRAVE, a ſhock of corn conſiſting of twenty-four ſheaves.

THREAF, a handful, a bundle, a pottle.

THROATING, the action of mowing beans againſt their bending, which is never done but in a thin crop.

THROATWORT, the name of a perennial weed common in paſture grounds. The ſtalk is cornered and undivided. The flowers grow in bunches at the top of the ſtalk. They are erect, of a beautiful purple colour, and divided in the middle into five acute ſegments.

TICHING, ſetting up turfs in ſuch a manner as they may be dried by the ſun, and fit for being burnt for their aſhes upon the land.

TIKE, an inſect found in dogs, ſheep, cows, &c.

TILLABLE, arable, fit for the plough.

TILLAGE, the act or practice of tilling, or cultivating land. *See the article* PLOUGHING.

"I was much pleaſed, ſays a correſpondent of the editors of the Muſeum Ruſticum, with an account which I received about ſix weeks ago, of a peculiar management of tillage at Market-Weighton, in the eaſt-riding of Yorkſhire, given to me by a ſenſible man of veracity, who was born and bred a farmer in that neighbourhood.

"The inhabitants of Market-Weighton have it ſeems five fields, two of a ſandy ſoil, and three of a ſtrong clayey ſoil; the former, as will eaſily be conjectured, deſtined to rye, and the others to wheat. Their ſandy lands are diſpoſed to four ſwathes breadth; and finding by experience that conſiderable parts of each land, towards each furrow, are ſtarved by the coldneſs of the water dripping from the higher parts of the lands, they have for many years altered their former method: and only ploughed the half of each land, viz. the two middle ſwathes: ſo that they have now excellent rye growing on the higher and dryer half of every land, and excellent meadow growing on the lower and wetter half, which being juſt two ſwathes, is moved with great eaſe and exactneſs.

"It will, perhaps, be thought by ſome, that by making narrower lands, they might have more dry land, and conſequently more corn. But I apprehend, theſe induſtrious huſbandmen find by experience, that when they make their lands narrower, and conſequently with leſs deſcent, the water ſtagnates in the higher parts, and conſequently ſpoils their whole crop. Nor could they, I ſuppoſe, ſow more corn on their lands, in their preſent diſpoſition, with convenience, as their preſent method allows them juſt one ſwathe on each ſide.

"They have rye and meadow in one of their two ſandy field every other year, and a fallow the next year. The having half of the field in graſs, affords good graſs for their ſheep, &c. in that year; and allows them to keep a good ſtock thereon; and this ſtock, in return, manures the ground conſiderably, both the fallow and the ſwarth. One of their wheat-fields affords them plenty of worſe or ſpring corn; and thus they are ſupplied with wheat, rye, ſpring corn, meadow, and ſummer graſs, from their five fields, which in any other management they could ſcarcely be.

"It is obſervable alſo, that by this management they only plough as much as four fields, and conſequently can afford one fifth more ploughing to every piece of ground in tillage, than they otherwiſe could, on ſuppoſition that their fields are all of the ſame extent.

"Theſe provident people, gentlemen, have another piece of management well worthy the attention of others. They have two great fairs for ſheep; one in ſpring, and the other in autumn. They hold the former of theſe fairs in one of their fallow fields, which is to be ploughed up in ſpring. The concourſe of ſheep, horſes, &c. manures this field ſurpriſingly, and then they turn in the dung before it be evaporated or baked. Their later fair is held on the other fallow field, which is ſoon to be ſown with hard corn. And here they receive equal benefit.

"Whether they have their ſpring fair on the rye or wheat field, I know not; but I apprehend them to have it on the former, as rye is ſown ſooner than wheat; and the time of ſowing might be too late for their autumnal fair.

"Whoever has ſeen the uſeleſs naſtineſs which is made by ſheep at fairs, in the ſtreets of great towns, will think this management of the Market-Weightoners highly deſerving of imitation; eſpecially in the latter end of the year, when the rains bring in much ſoil with the ſheep.

"I would, however, venture to recommend one improvement to theſe ſenſible people, viz. after a certain number of years to plough up one of their ſandy fields intirely, and to croſs-plough it, and endeavour to mix the ſoil of the ridges and furrows thoroughly together, and then to make the furrows where the ridges were, &c. and to ſow down the outward ſwathes of each land with ſeeds proper to the ſoil. The advantages hence reſulting, are ſo obvious, that it would be an affront to their underſtandings to inſiſt upon them." *Muſeum Ruſticum, vol.* VI. *pag.* 83.

TILLER, a branch or ſtem of corn.

To TILLER, to ſpread or ſhoot out.

TILLS, tares, or vetches.

TILTH, *or* TILT, the condition of the earth after ploughing, &c.

TIMOTHY-GRASS, the name of a graſs now cultivated in England, of which it is a native, though the ſeeds of it were carried from Virginia, by one Mr. Timothy Hanſon, to North Carolina, where it is now cultivated by the inhabitants; and from this circumſtance it received the name it now bears.

It thrives moſt in low, damp, marſhy grounds: for in ſuch ſoil and ſituation it will produce a fine turf in three weeks from the time of ſowing the ſeed. It is very luxuriant, grows to a conſiderable height, and has in ſome ſort the appearance of wheat or rye, having a broad blade or leaf.

All ſorts of cattle are very fond of this herb whilſt in a green growing ſtate; and it will not be improper to add, that they are nearly, if not quite, as fond of it, when dried and made into hay: but when it is intended for this uſe, it ſhould always be mown when it is in full ſap, juſt before it flowers, for if it is left longer before it is cut, being ſo luxuriant and quick a grower, it becomes harſh, and is much dryer and more chirky food, than when it is cut in its prime.

"Timothy

"Timothy-graſs, ſays an experienced farmer, in a letter to Dr. Templeman, is in appearance a coarſe graſs, very little promiſing to be a paſture agreeable to cattle. Indeed, its appearance ſo ſtrongly prejudiced many againſt it, that it would have been at once condemned to neglect, had it not been reſcued by the enterprizing diſpoſition of Mr. Rocque, who had ſown a conſiderable ſpot of ground with the ſeed firſt ſent from America; yet the fact is, that, whilſt in the ſap, it is more agreeable to horſes and cattle than any other graſs has been obſerved to be. Mr. Roque's horſe ſoon gave him a convincing proof of this; for having got looſe, he left very fine lucern, and the moment he reached the Timothy-graſs, inſtead of ranging about, as uſual, with horſes, he eat clean before him.

"Deer, which are very nice in their food, are ſo fond of it, that as I am very well aſſured by gentlemen from North America, they ſow Timothy-graſs there on the ſkirts of their corn land near the woods; in order to keep the deer from eating their corn; the Timothy-graſs being much more agreeable to them than even corn.

"The dry hay of the Timothy-graſs is exceedingly agreeable to cattle, as appears from a remarkable inſtance mentioned in a converſation in the Society for the Encouragement of Arts, &c. A worthy huſbandman, who had himſelf often experienced how fond his cows and horſes were of it, carried a friend into the field, that he might have ocular demonſtration of it. The huſbandman took a tuft of dry Timothy-hay in his hand, and as ſoon as one of the cows ſaw it, ſhe came inſtantly to feed on it, though there was plenty of good graſs under foot. Another cow ſoon followed the firſt, and both eat greedily of it: but each of them refuſed to eat the hay of common graſs, which happened to be mixed with it. So fond were the horſes and cows of this hay, that they would follow a perſon having ſome of it in his hand, as readily as they would one who carried corn for them.

"A very great advantage attending the Timothy-graſs is, that it thrives well in ſuch wet marſhy land as will ſcarcely yield any other good graſs; and here, its numerous and matted roots make ſo ſtrong a ſward, that land which was before a looſe mire, ſhall become ſo firm as to bear cattle and even carriages without their ſinking into it.

"It is almoſt needleſs to add, that in order to ſow Timothy-graſs ſeed in ſuch marſhy land, it muſt be drained, and then all the inequalities common in ſuch land, as well as the ſtrong matted roots of coarſe graſs, ſhould be taken up and burnt. The land being then ploughed and laid ſmooth, the aſhes ſhould be ſpread upon it, and the ſeed may be ſown early in the autumn; or rather, the plants ſhould be raiſed in a nurſery, and ſet in it at ſix or eight inches diſtance, every way, from each other. This graſs will alſo thrive well on a clay bottom, where water is apt to ſtagnate in rainy ſeaſons.

"The Timothy-graſs will grow to the height of three or four feet. I have been aſſured by a gentleman, that he has ſeen it between five and ſix feet high in Virginia. If it is cut down before the ſeed ripens, it will ſoon ſhoot anew, and yield a good ſecond crop. The fowl meadow graſs grows to the height of about three feet, and will ripen its ſeed twice in a ſeaſon: we may therefore infer, that it may be cut for hay thrice in a ſeaſon. It is not an early graſs; but as ſoon as it begins to ſhoot, it makes up for that loſs by its ſpeedy growth. During the drought of laſt ſummer, the ſecond crop made a ſurprizingly quick progreſs. Its not being an early graſs is perhaps no loſs; for as it delights in rather moiſt meadows, the ground might be poached, were cattle tempted to go early to feed on it.

"If from ſome imperfection in the ſoil, the plants of either of theſe graſſes do not fill the ground ſufficiently, they may be let to run to ſeed, which falling in the vacant ſpaces, ſoon ſupply the want. So far as we have yet obſerved in this country, theſe ſelf-ſown plants do not arrive at the ſize of the parent plants, which were ſet at due diſtances: and this affords good reaſon to think, that if the ſeed was ſown in broad-caſt, and the plants came up thick, they would in the ſame manner be ſtinted in their growth.

"The ſucceſs of the Timothy-graſs, when ſown alone, demonſtrates the utility of ſowing the ſeeds of each graſs ſeparately, in order to form a juſt eſtimate of their comparative values: for though this graſs is a native of England, being a ſpecies of the fox-tail, it has been hitherto rather neglected than cultivated, even though nature has pointed it out as an uſeful plant in wet meadows, by its early verdure and growth. I make no doubt but that the practice of raiſing graſſes ſeparately, will bring other no leſs valuable graſſes to light."

"The attention of the public, ſays Mr. Baker (in his report for the year 1765) particularly in England, has been very much engaged for ſome time paſt with this graſs, which is introduced under a new name, perhaps with a view the more conveniently to anſwer the purpoſe of the venders of the ſeed; for which I have given 14 ſhillings a gallon; and I am informed that in London, it was ſold laſt ſummer for five ſhillings a pint, which is 40 ſhillings a gallon.

"It is named Timothy-graſs, inſtead of its being called by its proper name, for a ſtrange reaſon, I think; namely, that one Mr. Timothy Hanſon, carried the ſeed of it from Virginia to North Carolina, (a great paſſage truly) where it is now cultivated by the inhabitants: others inſiſt that it was brought by Mr. Timothy to Carolina from New York. We are told, that from this circumſtance it received the name of Timothy: and in order to poſſeſs it of this name, and to make us believe it is not to be had in theſe kingdoms, we are told it is a native of America; a fact of which I have no doubt; but it is alſo a native of theſe kingdoms, and will be found to abound, more or leſs, in almoſt every meadow, particularly in moiſt grounds. I have found it riſe ſpontaneouſly in many parts of my land, even in the uplands, after I had manured and improved them; and the true name of this graſs is, the meadow-fox-tail, ſo called, I preſume, becauſe the head or ear of it, reſembles a fox's tail in ſhape.

"Mr. Stillingfleet's obſervations upon this graſs are clear, although ſhort, and therefore I ſhall beg leave to tranſcribe what he ſays.

"This graſs is found in great plenty, in our beſt meadows about London, and I believe, makes very good hay. Linnæus ſays, that it is a proper graſs to ſow on grounds that have been drained.

"I am informed, that the beſt hay that comes to London, is from the meadows where this graſs abounds. I ſaw this ſpring a meadow, not far from Hampſtead, which conſiſts of this graſs chiefly. This graſs is ſcarce in many parts of England, particularly in Herefordſhire, Berk-

Berkſhire, and Norfolk. [I am not ſurprized ſays Mr. Baker, at its being ſcarce in Berkſhire and Norfolk; becauſe the firſt is a gravel, and the latter a ſand. But wonder it abounds not in Herefordſhire, which is a deep wet country.]

"It might be gathered at almoſt any time of the year, from hay ricks, as it does not ſhed its ſeeds without rubbing, which is the caſe of but few graſſes.

Mr. Miller juſt mentions this graſs; and likewiſe another which he calls the ſmaller fox-tail, which I have alſo found upon my land very frequently; it reſembles the firſt named in every reſpect, except that it is much ſmaller.

"Mr. Sillingfleet mentions a third graſs of this kind, which he calls the water fox-tail. He ſays, "this is alſo found in meadows about town, that are ſound, but lie under water in winter; and perhaps might be proper to ſow on ſuch grounds."

"This laſt I have not met with; and really had many other writers of the preſent time, mentioned this third ſort, I ſhould have concluded it to be the ſame as that firſt named; but I have ſo great a deference to, and reliance upon this writer's judgment, that I have no doubt of their being a third graſs of the kind, which I ſhall uſe my endeavours to find. Mr. Stillingfleet has furniſhed us with an engraving of the firſt, but not of the water fox-tail.

"Several correſpondents of the *Muſeum Ruſticum*, have wrote upon the meadow fox-tail graſs, under the name of Timothy, ſome few of them very rationally; but upon the whole, their letters are not ſo inſtructive as might be expected, and tend principally to diſpute about trifles, and to furniſh panegyrics upon individuals; and as few of the letters ſeem to have ariſen from experience, I ſhall omit the taking further notice of them.

"I have, during the two laſt ſummers, collected by hand, of the native ſeed. I have bought of that which was ſold in Dublin, and ſaid to come from America. A noble lord, who is a member of the Society, received a preſent of this ſeed from America. He did me the honour to give me ſome of it. With this, and that which I bought, I have compared that which I collected, and I find them all to be exactly the ſame.

"Where the graſs riſes in ground which is in good condition, and in tillage I obſerve, that very early in the ſpring it affords a very luxuriant and fine paſture, of which all ſorts of cattle are very fond: but when the graſs riſes ſo high, as that the ſeed is approaching to maturity, it is exceeding coarſe, and I think muſt make very bad hay. But if it be ſown on rich ground, and ſhall not be ſuffered to ſtand longer than juſt for the heads or ears to unſheath from the leaves or blades, which they do in the ſame manner as wheat, I have no doubt but it will make good hay, and that it will offord an heavy crop.

"It is urged, as a recommendation of this graſs, that it will, ſome ſay in three weeks, form a ſod, equal to meadow of many years ſtanding; and that it will, on the deepeſt ſwamp or bog in a ſhort time make a ſod, which will bear horſes or waggons. I have had no experience of this, and do confeſs, I ſhould not care to venture my cattle and carriages upon ſuch a ſurface, unleſs I had before drained the ſwamp or bog; with that precaution I have no doubt, but the meadow fox-tail graſs will make ſound meadow, as many other graſſes will do, under proper care: yet, I muſt not omit to obſerve, that this graſs appears to be better ſuited to the improvement of moiſt low grounds, than the generality of graſſes, and would certainly be very uſeful upon drained and improved bogs."

TINE, a tooth or ſpike. And hence the common phraſe, of giving two or three tinings, ſignifies to draw the harrows twice or thrice over the ſame ſpot of ground.

TIT, a ſmall horſe.

TORE, rowen or winter-graſs.

TOVET, or *Toſet*, half a buſhel.

TRAMEL, an inſtrument or device, made ſometimes of leather, but more uſually of ropes, fitted to a horſe's legs to regulate his motion, and teach him to amble.

Tramel alſo ſignifies an iron inſtrument hanging in the chimneys, whereon to hang pots or kettles over the fire.

TRANSPLANTING, the act of removing trees or plants from the places where they are ſowed or raiſed, and planting them in others. *See the article* LUCERNE, PLANTING, &c.

TREE, the firſt and largeſt of the vegetable kind, conſiſting of a ſingle trunk, out of which ſpring forth branches and leaves.

Plantations of uſeful trees might be made to very great advantage in many places in every country, and the country greatly enriched by it, while the public would be alſo benefited by it, ſince it would raiſe a continual ſupply of timber uſed in ſhip-building, and on other public as well as private occaſions.

We have, in many places, heaths, and other barren and uncultivated lands, of very great extent; and how great an advantage would it be to the public, to bring theſe to be truly valuable? Many, if not all of theſe heaths, would be found on trial capable of producing trees; and ſome of them are truly the remains of deſtroyed foreſts; and, though the profits to be reaped from the planting theſe would come late, yet the expence of doing it would be very trifling in compariſon of that profit, and the means eaſy.

The authors who have given rules for planting, having employed themſelves only about ſmall ſpots of ground, the eſtabliſhing orchards, or parks, are by no means to be ſuppoſed proper guides in attempts of this kind; and Monſieur de Buffon, who had a great opinion of the knowledge of our Evelyn and Miller, who ſeem to ſpeak of every thing from their own experience, found, when he ſet about large plantations, that their opinions and rules were erroneous; and was obliged to have recourſe to experiments only; which he varied a thouſand ways: and, though many of them proved unſucceſsful, yet they all gave hints towards others, by which the attempt might afterwards be brought to ſucceed.

This ſagacious enquirer into the operations of nature in the growth of vegetables, having ſet apart a conſiderable quantity of land for the trial, and procured a number of young trees, firſt divided the whole quantity into a number of ſmall ſquares, and having made a plan of it, examined the nature, depth, and other circumſtances of the ſoil in each, and minuted the whole down on a proper part of the plan; that himſelf, or whoever ſucceeded him, might judge from the different growths of a number of trees planted in the ſame ſtate in the different ſoils, the different advantages and diſadvantages of every circumſtance in the depth and nature of the ground, in regard to the growth of uſeful trees. Different numbers of labourers

were

were employed about different ſpots of this ground, and the acorns for the young growth planted at different ſeaſons; but the reſult in general was, that what ſhould ſeem the beſt methods ſucceeded the worſt; and thoſe pieces where many labourers were employed, and the acorns planted before winter, were much thinner of young oaks, than thoſe where the leaſt labour had been beſtowed upon the ground, and where the acorns had been planted in the ſpring; but thoſe places which ſucceeded beſt from the ſowing, were thoſe which had the acorns planted in holes made by a pickax, without any preceding culture of the ground. And thoſe where the acorns had only been laid upon the earth, under the graſs, afforded a great number of vigorous young trees, though the greater part had been carried away by birds, and other devouring animals. Thoſe ſpots of ground where the acorns were ſet ſix inches deep, were much worſe furniſhed with young ſhoots, than thoſe where they had been buried but at an inch deep, and in ſome places where they were buried at a foot deep, not one ſhoot appeared, though in others where they had been buried at nine inches there were many.

Thoſe acorns which had been ſteeped for eight or nine days in wine lees, and in the water of the common ſewers, appeared out of the ground much earlier than thoſe which were put in without this previous management.

But the moſt ſucceſsful of all the trials was that of planting in the ſpring ſuch acorns as had been ſown together in another place, and had time to ſhoot there; of theſe ſcarce any failed, and the plantation was perfectly flouriſhing, though the growth of theſe young ſhoots was not ſo quick and vigorous as thoſe of the acorns which had remained, where firſt ſown; which was probably owing to the injury the tender radicles received in tranſplanting.

Thus ſucceeded the experiments by ſowing, while, of thoſe made by planting young trees, ſuch as had been brought out of woods, and places under covert, ſucceeded much worſe than thoſe which had grown in more expoſed places.

The young trees of the ſeveral parts of the plantation kept on their growth in the manner they had begun to ſhoot, thoſe of the more laboured parts continuing more weak, and lower than thoſe of the leſs laboured.

Thus were a number of neceſſary experiments carefully tried, and the reſult of the whole was, that to make a plantation of oaks, on a ſoil of the common clayey or loamy kind, the moſt ſucceſsful method is this: the acorns muſt be preſerved during the winter in the earth in this manner: let there be made a bed of earth ſix inches deep, on this place a layer of acorns two inches deep, over theſe lay a bed of another half foot of earth, over that another layer of acorns, and ſo on ſucceſſively, till as many are employed as there will be occaſion for; the whole is then to be covered with a foot depth of earth, to preſerve all from the froſt. In the beginning of March, theſe beds are to be opened, and the acorns which will by that time have ſhot out, and are then in reality ſo many young oaks, are to be planted out at a foot diſtance each, and the ſucceſs of a plantation of this kind need not be feared. This is a manner of planting that is done at a ſmall expence, and even that might be in a great meaſure ſpared, were it not for the birds and other devouring animals; ſince, could the acorns be defended from theſe, they might be only laid on the ſurface of the ground under the graſs in autumn, and they would infallibly ſhew themſelves in ſo many young oaks the ſucceeding ſpring.

It is eaſy to continue the carrying the acorns, when taken out of their winter's bed, to the place where they are to be planted, without doing them much injury; and the ſmall ſtop the tranſplanting puts to their growth, is in reality rather an advantage than an injury; ſince it only retards the young ſhoots for about three weeks, or leſs than that: and by that means ſecures them from the few cold mornings that may be expected about the time of their natural appearance.

As it appears from theſe experiments, that the acorns ſucceeded beſt where the leaſt labour and preparation of the land was beſtowed upon them; and that tranſplanting the young oaks, or even removing the acorns, from whence they were laid to ſprout, retarded the growth of the plants: alſo that the plants roſe in the ſpring, and proſpered, that were only laid on the ground, under the graſs in autumn, and is the natural way by which oaks are propagated; this appears therefore to be the beſt method of propagating theſe trees; to which the only objection is, that the acorns ſown in this manner are liable to be devoured by birds, and other animals, becauſe expoſed to their view.—This may in great meaſure be prevented by paring the ſurface of the ground with a breaſt plough, laying the acorns upon the pared ground, and covering them with the turf that was pared off; or ſtill more expeditiouſly, and at a leſs expence, by paring the ſurface with a paring plough, ſuch as is ſometimes uſed to pare land for burn-beating; a man immediately following the plough, to ſow the acorns pretty thick, and another to throw back the turf upon the ſeed, will cover it very ſecurely from thoſe devourers, which uſually deſtroy the acorns, when expoſed to their view—Where neither the breaſt, nor paring plough, can be uſed, the paring axe may be uſed.

TREFOIL, a genus of plants, the flower of which has a tubulous permanent empalement of one leaf: it is of the butterfly kind, drying in the empalement. The ſtandard is reflexed, the wings are ſhorter than the ſtandard, and the keel is ſhorter than the wings: it has ten ſtamina, nine are joined, and one is ſeparate, terminated by ſingle ſummits, and an almoſt oval germen ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma. The germen afterwards becomes a ſhort pod with one valve, containing a few roundiſh ſeeds.

Mr. Miller enumerates twelve different ſpecies of trefoil, the firſt of which is well known in England by the name of red clover; and the manner of cultivating this plant has been already deſcribed under the article CLOVER.

The ſecond ſort, namely, the white Dutch clover, grows naturally in moſt of the paſtures in England, and is generally known among the country people by the name of white honey ſuckle.

This is an abiding plant, whoſe branches trail upon the ground, and ſend out roots from every joint, ſo that it thickens and makes the cloſeſt ſward of any of the ſown graſſes; and it is the ſweeteſt feed for all ſorts of cattle yet known: therefore when land is deſigned to be laid down for paſture, with intent to continue ſo, it ſhould be ſown with the ſeeds of this plant. The uſual allowance of this ſeed is eight pounds to one acre of land; but this ſhould never be ſown with corn, for if there is a crop of corn, the graſs will be ſo weak under it, as to be ſcarce worth ſtanding; but ſuch is the covetouſneſs of moſt farmers, that they will not be prevailed on to alter their old cuſtom of

of laying down their grounds with a crop of corn, though they loſe twice the value of their corn by the poorneſs of the graſs, which will never come to a good ſward, and one whole ſeaſon is alſo loſt; for if this ſeed is ſown in the ſpring without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. The ſeed of this ſort may alſo be ſown in autumn, and this autumnal ſowing, if the ſeeds grow kindly, will afford a good early crop of hay the following ſpring; and if, after the hay is taken off the land, the ground be well rolled, it will cauſe the clover to mat cloſe upon the ground, and become a thick ſward.

The ſeeds of this white Dutch clover is annually imported from Flanders, by way of Holland, whence it received the name of Dutch clover; not that it is more a native of that country than of this, for it is very common in moiſt paſtures, in every county in England: but the ſeeds were never collected for ſowing in this country till of late years; nor are there many perſons here, even now, who ſave this ſeed, though it may be done if the ſame method as is practiſed for the red clover, be taken with this ſort; it ſhould therefore be recommended to every farmer, who is deſirous of improving his land, to ſow carefully an acre or two of this white clover for ſeed, which will ſave him the expence of buying for ſome years, when the price is great; and there will be a ſure market for any quantity they he may have to ſpare.

The third ſort, namely hop clover, called by ſome yellow meadow trefoil, grows naturally among the graſs in the upland paſtures of this country; but the ſeeds are frequently ſold in the ſhops, and are by many mixed with the other ſorts of clover and graſs-ſeeds, for laying down ground to paſture. This plant grows with upright branching ſtalks about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oblong and heart-ſhaped, but reverſed, the narrow point joining the foot ſtalks. The flowers, which are yellow, grow from the wings of the ſtalk, upon long foot-ſtalks, collected into oval imbricated heads, having naked impalements lying over each other like ſcales, ſomewhat like the flowers of hops, from whence the plant had the name of hop-clover. But there are two ſorts of this clover, which grow naturally in England. The other is a much ſmaller plant than this, and generally known by the name of none-ſuch, or yellow hop-trefoil.

The hop-clover is ſtrongly recommended by the following circumſtances. 1. It not only grows, but flouriſhes on the moſt barren ſands, and therefore muſt be a very proper graſs to cultivate on ſuch unfertile ſoils, where any other graſs that is worth notice will not grow at all. 2. It is not apt to ſwell cattle, as the red clover does. 3. In good ground it will continue long, and bear a very good ſeed or crop, as Mr. Tull, though prejudiced againſt clovers, confeſſes; and, by its flouriſhing both on ſands and clay, which have not been ploughed for many years, it ſeems likely to continue long in any ſoil.

The fifth ſort grows naturally on chalky lands in many parts of England; and in ſome countries the ſeed is ſown after the ſame manner of the common red clover, eſpecially on chalky ground, where it will thrive, and produce a better crop than clover. The ſtalks of this are hairy, and grow erect to the height of two feet or more, garniſhed with trifoliate leaves, ſtanding upon long foot-ſtalks, whoſe lobes are longer than thoſe of the red-clover, and have no marks of white; they are of a yellowiſh green colour, and are covered with ſoft hairs. The flowers grow in oval ſpikes at the end of the branches; they are of a pale copper colour; their petals are long and tubulous, but the brim is divided into two lips, as the other ſorts.

This is known by the title of trefoil, in the places where it is cultivated; but the ſeedſmen ſell the hop clover by that name, ſo they make no diſtinction between this, the hop-clover, and none-ſuch; therefore, by which of theſe three titles the ſeeds are bought, they prove the ſame.

This ſort of trefoil is much cultivated in that part of Eſſex which borders upon Cambridgeſhire.

The ſixth ſort grows naturally in Spain and Italy; this has upright ſtalks near two feet high, which are hairy, garniſhed with trifoliate leaves, having roundiſh lobes, which are ſawed at their points. The flowers are produced at the top of the ſtalk in long, obtuſe, hairy ſpikes, of a bright red colour, ſo make a pretty appearance during their continuance. It is an annual plant, ſo is not proper for ſowing as fodder.

The ſeventh ſort is an annual plant, which grows naturally in the South of France and Italy; it riſes with a ſtrong ſmooth ſtalk near three feet high, garniſhed with trifoliate leaves, whoſe lobes are two inches and a half long, and near a quarter broad, ſtanding upon long foot-ſtalks, which are embraced by ſtipulæ or ſheaths their whole length. Their flowers are produced at the top of the ſtalks in very long ſpikes; they are of a beautiful red colour, ſo make a fine appearance. It flowers in July, and the ſeeds ripen in autumn.

The eighth ſort grows naturally in Spain and Italy; this riſes with a ſlender ſtiff ſtalk near two feet high, garniſhed with trifoliate leaves, whoſe lobes are very narrow and hairy. The flowers are produced at the top of the ſtalks in oblong conical ſpikes; the indentures of their empalements end in long briſtly hairs, which are almoſt equal in length; the ſpikes are hairy, and the flowers of a pale red colour.

The ninth ſort is the common hare's foot trefoil, which grows naturally upon dry gravelly land in moſt parts of England, and is a ſure indication of the ſterility of the ſoil, for it is rarely ſeen upon good ground. This plant is ſeldom eat by cattle, ſo is unfit for paſture, and is only mentioned here becauſe it is ſometimes uſed in medicine; it is an annual plant, whoſe root decays ſoon after it has perfected its ſeeds.

The tenth ſort grows naturally on arable land in many parts of England; this has trailing ſtalks, which put out roots at their joints. The leaves ſtand upon long ſlender foot-ſtalks; the lobes are roundiſh, and ſawed on their edges; the flowers are collected in roundiſh heads, ſtanding upon ſlender foot-ſtalks, which riſe from the wings of the ſtalks; theſe have bladdery empalements, which terminate in two teeth. When theſe lie on the ground, their globular heads, having a little bluſh of red on their upper ſide toward the ſun, and the other part being white, have a great reſemblance of ſtrawberries, and from thence it was called ſtrawberry trefoil.

Theſe ſorts are preſerved in botanic gardens for variety; they are eaſily propagated by ſeeds, which may be ſown on an open bed of ground, either in autumn or ſpring.

The plants which come up in autumn, will grow much larger, and flower earlier in the ſummer than thoſe which are ſown in the ſpring, ſo from thoſe good ſeeds may be always obtained, whereas the others ſometimes miſcarry. When the plants come up, they require no other care than to keep them clean from weeds, and thin them where they are too cloſe.

The eleventh ſort is the common melilot, which is uſed in medicine, and has been already deſcribed under the article MELILOT, which ſee.

The twelfth ſort grows naturally in Bohemia and Auſtria, but has been long cultivated in England as a medicinal plant, though at preſent it is rarely uſed; it is annual. The ſtalks are large, hollow, and channelled; they riſe about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oval, and ſlightly ſawed on their edges, ſtanding upon pretty long foot-ſtalks. The flowers are collected in oblong ſpikes, which ſtand upon very long foot-ſtalks, ſpringing from the wings of the ſtalk at every joint; they are of a pale blue colour, ſhaped like thoſe of the common melilot; theſe appear in June and July, and are ſucceeded by ſmall yellow ſeeds, of a kidney ſhape, two or three being included in each ſhort pod. The whole plant has a very ſtrong ſcent like that of fenugreek, and periſhes ſoon after the ſeeds are ripe. *Miller's Gard. Dict.*

TRENCH, a furrow cut in the earth for draining land. *See the articles* BOG and DRAINING.

TRENDLE, any thing that turns round.

To TREFALLOW, to plough land the third time before ſowing.

TROUGH, a long veſſel for holding water, &c.

TRUG, or TRUGG, a hod for mortar.

TRUNDLE, a ſort of carriage with low wheels, for carrying heavy and cumberſome loads.

TRUNK, the ſtem or body of a tree; or the part between the ground and the place where it divides into branches.

TRUSS, a bundle of hay, ſtraw, &c.

A truſs of hay muſt contain fifty-ſix pounds, or half a hundred weight; thirty-ſix truſſes make a load. In June, July, and Auguſt, a truſs of new hay muſt weigh ſixty pounds.

TUMBREL, a dung-cart.

TUMOUR, a preternatural ſwelling or eminence riſing in any part of a horſe, and ariſes either from external injuries, or internal cauſes.

Swellings cauſed by external accidents, as blows and bruiſes, ſhould at firſt be treated with reſtringents; thus, let the part be bathed frequently with hot vinegar or verjuice, and, where it will admit of bandage, let a flannel wetted with the ſame be rowled on: if by this method the ſwelling does not ſubſide, apply, eſpecially on the legs, a poultice with red wine lees, ſtrong beer grounds, and oatmeal, or with vinegar, oil, and oatmeal; either of theſe may be continued twice a day, after bathing, till the ſwelling abates; when, in order to diſperſe it intirely, the vinegar ſhould be changed for comphorated ſpirit of wine, to four ounces of which, may be added one of ſpirit of ſal armoniac; or it may be bathed with a mixture of two ounces of crude ſal armoniac boiled in a quart of chamber-lye, twice a day, and rags dipped in the ſame may be rolled on.

Fomentation made by boiling wormwood, bay-leaves, and roſemary, and adding a proper quantity of ſpirits, are often of great ſervice to thin the juices, and fit them for tranſpiration; eſpecially if the injury has affected the joints.

But in bruiſes, where the extravaſated blood will not by theſe means be diſperſed, the ſhorteſt way is to open the ſkin, and let out the grumes.

Critical tumours, or ſwellings which terminate fevers, ſhould by no means be diſperſed; except when they fall on the paſtern or coffin joint, ſo as to endanger them: in this caſe the diſcutient fomentation ſhould be applied three or four times a day, and a cloth or flannel frequently wrung out of the ſame ſhould be bound on, in order to keep the joint continually breathing.

But if the ſwelling fixes under the jaws, behind the ears, on the poll, withers, or in the groins and ſheath, &c. it ſhould be encouraged and forwarded by ripening poultices, wherever they can be applied; oatmeal boiled ſoft in milk, to which a proper quantity of oil and lard is added, may anſwer this purpoſe; or the poultice recommended in treating of the ſtrangles: theſe muſt be applied twice a day, till the matter is perceived to fluctuate under the fingers, when it ought to be let out; for which purpoſe, let the tumour be opened with a knife or ſtrong lancet, the whole length of the ſwelling, if it can be done ſafely, for nothing contributes ſo much to a kind healing, as the matter's having a free diſcharge, and the opening being big enough to dreſs to the bottom.

Pledgits of tow ſpread with black or yellow baſilicon (or the wound ointment) and dipped in the ſame, melted down with a fifth part of oil of turpentine, ſhould be applied to the bottom of the ſore, and filled up lightly with the ſame, without cramming; it may be thus dreſſed once or twice a day, if the diſcharge is great, till a proper digeſtion is procured, when it ſhould be changed for pledgits ſpread with the red precipitate ointment, applied in the ſame manner.

Should the ſore not digeſt kindly, but run a thin water and look pale, foment as often as you dreſs, with the above fomentation; and apply over your dreſſing the ſtrong beer poultice, and continue this method till the matter grows thick, and the ſore florid.

The following ointments will generally anſwer your expectations in all common caſes, and may be prepared without, as well as with, the verdigreaſe.

Take Venice turpentine and bees wax, of each a pound; oil of olives one pound and a half; yellow roſin twelve ounces: when melted together, two or three ounces of verdigreaſe finely powdered may be ſtirred in, and kept ſo till cold, to prevent its ſubſiding.

Take of yellow baſilicon, or the above ointment without verdigreaſe, four ounces; and red precipitate finely powdered half an ounce: mix them together cold, with a knife or ſpatula.

This laſt applied early, will prevent a fungus, or proud fleſh, from ſhooting out; for if you dreſs too long with the above digeſtive, the fungus will riſe faſt, and give ſome trouble to ſuppreſs it; when it will be neceſſary to waſh the ſore as often as you dreſs, with a ſolution of blue vitriol in water, or to ſprinkle it with burnt allum and precipitate. If theſe ſhould not be powerful enough, touch with a cauſtic, or waſh with the ſublimate water, made by diſſolving half an ounce of corroſive ſublimate in a pint of lime-water.

But this trouble may in a great meaſure be prevented, if the ſore is on a part where bandage can be applied with compreſſes of linen cloth: for even when theſe excreſcences regerminate, as it were, under the knife, and ſpring up in ſpite of the cauſtics above-mentioned, they are to be ſubdued by moderate compreſſion made on the ſprouting fibres, by theſe means.

Authors on farriery have in general given very proper receipts to anſwer every intention of this kind by medicines; but as they have not, I think, laid down ſufficient rules for their application in thoſe caſes where they are moſt wanted, I hope the following general directions will not be unacceptable; as the difficulty in healing ſome kinds of ſores ariſes frequently from the unſkilful manner of dreſſing them.

It may be neceſſary then to obſerve here once for all, that the cures of moſt ſores are effected by the ſimpleſt methods, and that it is often of much more conſequence to know how to dreſs a ſore, than what to dreſs it with; and in this conſiſts indeed the chief art of this branch of ſurgery; for the moſt eminent in that profeſſion have long ſince diſcovered, that variety of ointments and ſalves are unneceſſary in the cure of moſt wounds and ſores, and they have accordingly diſcarded the greateſt part, formerly in repute for that purpoſe; repeated obſervations having taught them, that after the digeſtion, nature is generally diſpoſed to heal up the wound faſt enough herſelf, and that the ſurgeon's chief care is to prevent a luxuriancy, commonly called proud fleſh; which all ointments wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and ſupple; and which dry lint alone, early applied, as eaſily prevents, by its abſorbing quality, and light compreſſion on the ſprouting fibres.

Thus if a hollow wound or ſore is crammed with tents, or the dreſſings are applied too hard, the tender ſhoots of fleſh from the bottom are prevented puſhing up; and the ſides of the ſore in time from this diſtention may grow horny, and turn fiſtulous; nor has the matter by this method a free diſcharge.

On the other hand, if ſores of any depth are dreſſed ſuperficially, the external parts being more diſpoſed to heal and come together than the internal, they will fall into contact, or heal too ſoon; and the ſore not filling up properly from the bottom, will break out afreſh.

Hence we may juſtly conceive how little ſtreſs is to be laid on famous ointments, or family ſalves, unſkilfully applied; for unleſs this due medium is obſerved, or obtained in the dreſſing, no hollow ſore can heal up properly.

I thought it neceſſary to be a little explicit on this head, as gentlemen ſo frequently complain of being diſappointed in their cures, notwithſtanding the excellency of their ointment, or balſam; and to convince them that leſs confidence ſhould be put in theſe favourite medicines than is generally imagined; for where the habit is ſound, and the blood and juices in good condition, there are few ſimple dreſſings that will not ſucceed; and when otherwiſe, the moſt pompous will not avail, till theſe are rectified by proper internal medicines.

As ſoon then as a good digeſtion is procured (which is known by the thickneſs and whiteneſs of the matter diſcharged, and the florid red colour at the bottom of the ſore) let the dreſſings be changed for the precipitate medicine; or the ſore may be filled up with dry lint alone, or dipped in lime-water with a little honey and tincture of myrrh, or brandy: about a fifth part of the latter to one of the former; a pledgit of lint dipped in this mixture ſhould alſo be applied to the bottom of the ſore, which ſhould be filled up with others to the ſurface or edges, but not crammed in too hard, as before obſerved, nor yet applied too looſely.

By this method, the ſore would incarn, or heal up properly, and ſoft ſpungy fleſh would be prevented, or ſuppreſſed in time; whereas when ointments or ſalves are too long continued, a fungus or proud fleſh, is thereby ſo encouraged in its growth, that it requires ſome time to deſtroy and eat it down again: a proper compreſs of cloth, and a linen roller is abſolutely neceſſary both for this purpoſe, and to ſecure on the dreſſings, wherever they can conveniently be applied. *Bartlet's Farriery, page* 236.

TUPP, a ram.

TUPPING-TIME, ramming time.

TURF, a blackiſh, ſulphureous earth, uſed in ſeveral parts of England, Holland, and Flanders, as fuel.

In Flanders, their turf is dry or pared from off the ſurface of the earth, and cut in form of bricks. The ſedge, or ſpecies of graſs growing very thick on the turf earth, contributes greatly, when dry, to the maintenance of the fire.

The Dutch take their turf from the bottom of the dykes or canals which run acroſs moſt of their lands; by which means they not only ſupply the defect of wood, which is very great in moſt of the United Provinces, but alſo keep their dykes clear and navigable: this turf earth is very black. As they take it up from the bottom of the dykes, they ſpread it about the edges of ſuch a thickneſs, as that it may be reduced to three inches when moderately dried. In this condition they cut it into pieces of turfs ſeven or eight inches long, and three broad, and, to complete the drying, lay them up in heaps, and at laſt in ſtacks.

In the north of England, Scotland, &c. turf is dug out of ſoft, moiſt, rotten earth, called peat-moſs. They dig horizontally from the ſurface, to the depth of about four feet, with a ſpade, which at once faſhions and takes them out in parallelopipeds nine or ten inches long, and three ſquare; which are ſpread on the ground to drain as faſt as dug; and then ſet up an end three or four againſt each other, for the wind to blow through them; and at laſt they are ſtacked or houſed The pits or dykes in a few years fill up again, and afford a freſh crop.

The turf or peat, that is cut horizontally, is uſually dug out in holes or pits, and cannot conveniently be dug ſo deep, nor in ſuch a regular manner as when dug perpendicularly, the banks in this laſt method of cutting being in ſtraight lines; as in ſome parts of England more ſouthward, particularly in Wiltſhire, and near Newbury, in Berkſhire, where great quantities of peat have been dug in that manner.

The ſurface of theſe peat grounds is commonly a black, moory and dry crumbling earth, of about a foot deep, more or leſs, with ſometimes a ſtratum of whitiſh earth lying under it, mixed with many ſmall ſhells of the perewinkle kind; having the properties of other ſhell marle, but in a lower degree than the ſhell marle found near the ſea. The peat below is of different depths, from two or three to five or ſix feet, ſometimes deeper; and below the peat is ſand or clay. The peat ſoil is wet, and towards the top it is moiſt.

When the peat is to be cut, the ground is marked on the ſurface, in a ſtraight line of a length at pleaſure, and between three or four feet broad, which is called the pit:

the ſurface is then dug level with a common ſpade, and the moory earth carried away, and laid in a heap, in ſome convenient place, to be burnt to aſhes. If the water does not riſe to the top of the pit, it is penned up almoſt to the top, by a dam made up below: for the peat is cut in the water with a narrow ſpade, ſhod at the lower end: the ſpade is about four feet long, beſides the handle, and four inches broad, and has an ear, or a ſharp iron on one ſide of it, bent to a right angle, which ſerves to cut and ſeparate one ſide of the peat from the pit, as the back of the ſpade does the other. In this manner every peat is formed into an oblong, four inches ſquare, and about four feet deep, if the peat earth runs ſo deep. The cutter eaſily breaks the peat at bottom, by leaning the ſpade forward, which riſes in the water upon the ſpade, and is then laid flat, upon a flat broad bottomed wheel-barrow. The peats being laid cloſe ſide by ſide, in three or four layers high, are wheeled away, ſlipped off the barrow upon the ground, as cloſe as they can lie, where they remain tell dry on one ſide; and then turned to dry on the other. Sometimes in wet ſummers, they are ſet up on end, in ſmall heaps, to dry. In very fine weather they will be dry in about a fortnight or three weeks, by turning them on the ground by hand.

The peat, when firſt cut, is about four inches ſquare, and ſhrinks in drying to about three inches ſquare, and alſo ſomething in the length; ſo that upon the whole, they are reduced in drying to about half their firſt dimenſions, but not equally; the hardeſt black peat, which are the beſt, ſhrink leſs than thoſe that are ſpongy. The proper time to cut the peat is from March, when the froſts are gone off, to September, or between five and ſix months.

A quantity of ground is neceſſary to dry the peat upon, in proportion to their length. The peat of an acre, that run to about a yard deep, will require nine acres to turn and dry the peat upon, if ſo much was to be dried at once: for the peat being four inches ſquare at the end, the ſide of the peat upon the ground, has nine times that ſurface: and in that proportion for a larger or ſmaller quantity of land to be cut out: and ſome room muſt be left for paths, at proper diſtances.

The peat land here is ſold at a high price, from ſixty or ſeventy to one hundred and twenty pounds per acre; and when the buyer has cut out the peat, the land reverts to the original proprietor; which, if it lies ſo low, that it cannot be drained, is of little value; but if the water can be carried off, and it lies near a river or ſtream of water, the land is levelled, and laid in a proper manner to be floated; and in that caſe the improvement is very great. For it frequently happens that the ſurface of the peat land lies ſo high and dry, before the peat is cut out, that the herbage is of ſmall value, yielding only ſmall crops of coarſe graſs; but when the ſurface, by cutting the peat out, is ſunk low enough to be watered, and that water can be carried off, ſuch land is then worth above double, or even treble its former value, without any expence to the owner: for the land is laid level by the buyer of the peat.

I ſaw a tract of land there about one hundred acres, belonging to one farm, which had been examined by boring with an auger; the peat was very deep, and being near a market, was valued at one hundred pounds an acre. And as it lay convenient to water, which could be carried off, the land, after the peat was cut out, would be improved, and produce much greater crops of graſs than before the peat was cut out of it.

The peat buyer has very little trouble in cutting and ſelling it; for he employs a cutter, who cuts, dries and delivers the peat, for which he is paid by the load, of forty-two buſhels of dry peat per cart load: he cuts and removes the ſurface that lies above the peat earth, and levels the ground after the peat is all cut out. He is reckoned to earn from two ſhillings and ſixpence to three ſhillings a day.

An acre of peat ground, of one ſpade, or four feet deep, produces from one thouſand to one thouſand four hundred cart loads of dry peat, which was ſold formerly at three ſhillings per cart load on the ſpot; but is conſiderably advanced, ſince the peat land in that country became ſcarce. One man can cut about ſix loads of dry peat in a day.

If the weather is ſo favourable, as that ſix dryings can be carried off the ground in a ſeaſon, about two acres and a half of land will be room ſufficient to ſpread and dry the peat upon, produced in one ſeaſon from an acre of peat of four feet deep.

The peat runs ſometimes but two or three feet deep, and is then cut at once; but when it runs deeper than three feet and a half or four feet, it is cut at twice; and the water at each cutting muſt be kept up near the ſurface of the ground that is cutting: for then the peat is the eaſier cut, and eaſier broke off at bottom, and brought up upon the ſpade to the ſurface of the water.

When it is not intended to water the land after the peat is cut out, and therefore of no uſe to level it, all the ſurface is carried away, and reduced to aſhes: but if the bottom is to be levelled for watering, the ſurface of the land, as being the moſt fertile part of it, is thrown down upon the bottom to level it for watering; and ſometimes all the earth above the peat, is thrown down upon the bottom, when neceſſary to raiſe it, the turf, and alſo the moory earth; when this is done, the moory earth ſhould be thrown down firſt, and the turf for ſtaple laid uppermoſt.

In wet ſummers, the peat cannot be all dried ſufficiently for ſale: when that happens, the damaged and broken peat is burnt upon the ſpot, or carried to the heap of turf and moory earth, where thoſe, together with the white marly earth, are burnt to aſhes, with a ſlow ſmothering fire, and thrown up in heaps of a round form; or long, like the ridge of a houſe; where, in a ſhort time, by the changes of weather, a cruſt is formed upon the ſurface of the heap, which throws off the rain, and preſerves the aſhes pretty dry; but as the ſalts of the aſhes are liable to be waſhed out by much wet, and the value of them are thereby conſiderably leſſened, ſome are at the expence of erecting ſheds, to keep their aſhes dry, till they can diſpoſe of them.

The expence of collecting the materials for theſe aſhes, and burning them, is about a penny or three half-pence per buſhel; and they are ſold to the farmers at about two-pence half-penny or three-pence per buſhel upon the ſpot; but the price was advancing, on account of the demand for them, and moſt of the peat land being cut out. They uſe baſkets for meaſuring the aſhes, of ſixteen inches diameter at top, and twenty inches deep, meaſured diagonally, and heaped meaſure. The ſame baſkets ſerve for meaſuring the dry peat. Forty-two of theſe buſhels of aſhes is called a cart load.

The

The quantity of aſhes produced from a cart load of peat, burnt in the chimney, if the beſt peat, is about five buſhels; but in digging peat, the cutter is apt to thruſt the ſpade deeper than the peat, ſo that the lower ends of the peat, having in them a mixture of clay or ſand, produce more aſhes than the net peat ſoil; but the aſhes in that caſe are of an inferior quality: for the genuine peat ſoil contains much ſulphur, and produce the ſtrongeſt aſhes, whereof ſix or eight, to ten or twelve buſhels, are commonly ſufficient to dreſs an acre of corn or clover: for the laſt of theſe crops, and for graſſes in general, whether the natural or cultivated graſſes, peat aſhes are a great improvement.

The aſhes from peat burnt in chimneys, being of the beſt ſort, and kept dry are the moſt valuable, and ſell at about double the price of the aſhes burnt in the field. Formerly theſe aſhes were ſold at a ſhilling per buſhel down to ten-pence; this was at firſt, and before peat was burnt in great quantities within doors. They afterwards ſunk in price to about ſix-pence the buſhel; and ſince that advanced again.

Some have thought that the peat ſoil has a kind of vegetative quality, and will grow up again in a courſe of years after it has been cut out; but this is a miſtake. In boggy ſoils or fens, the ſpongy peat that has been dug out of them, will indeed grow up again; becauſe the peat of ſuch ſoils, is a compoſition of the roots of æquatic plants, which grow and produce new roots, till the pits are again filled with them, as at firſt, and then may be cut again, and will produce peat or turf as at firſt.

But the peat ſoil we have been treating of, is very different from that of the turf bogs. The peat ſoil is a compoſition of rotten wood, moſt of it entirely rotten, and ſome but partly ſo: trees of various kinds and ſizes are found in the peat ſoil, ſome of oak, of thirty, forty feet, or more in length, the heart hard and ſound, and only the ſap rotten; abundance of nut-ſhells alſo, and other indications, that theſe peat lands were formerly woods. When the ſoil made up of theſe, is cut out for peat, it is evident that it cannot grow up again into a peat ſoil: and there have been ſome inſtances in that country of peat being cut in pits horizontally, before they came to be expert in the preſent method of cutting it perpendicularly; and as theſe pits were cut irregularly in ſome parts deep, and others ſhallow, and much of the ground miſſed, and not cut at all, the land was all cut over again, in a regular manner, in order to get all the peat out of it. The manner of the firſt cutting was then obſerved; and the marks of the ſpade at the firſt cutting was in ſeveral places plainly viſible; which ſhews that peat ſoil does not vegetate, and that peat once cut out, will not grow again, and fill up the old pits with the ſame kind of ſoil. This is taken notice of here, that the owners of ſuch land may not be miſled with the erroneous opinion of a new growth of peat ſoil, after it has been once cut out.

TURF-ASHES. *See the article* ASHES.

TURF-BOGS. *See* BOG, MOOR, and MOSS.

TURFING-SPADE, an inſtrument uſed to undercut the turf, after it is marked out with the plough.

TURKEY, the name of a well known fowl, reared in many parts of England.

"Moſt of our houſewives, ſays a Swediſh author on huſbandry, have long deſpaired of ſucceſs in rearing turkeys, and complained that the profit rarely indemnifies them for their trouble and loſs of time: whereas, continues he, little more is to be done than to plunge the chick into a veſſel of cold water, the very hour, or if that cannot be, the day it is hatched, forcing it to ſwallow one whole pepper-corn, and then reſtoring it to its mother. From that time it will become hardy, and fear the cold no more than a hen's chick. After which it muſt be remembered that theſe uſeful creatures are ſubject to one particular malady whilſt they are young, which carries them off in a few days. When they begin to droop, examine carefully the feathers on their rump, and you will find two or three, whoſe quill part is filled with blood. Upon drawing theſe the chick recovers, and after that requires no other care than what is commonly beſtowed on poultry that range the court yard.

"Theſe articles are too true to be denied; and in proof of the ſucceſs, three pariſhes in Sweden have, for many years, gained ſeveral hundred pounds by rearing and ſelling turkeys." *Rural Oeconomy, page* 739.

TURNEP, or *Turnip*, an eſculent plant, of which there are three ſpecies enumerated by Miller. The firſt is the turnip which is commonly cultivated in the fields, of which there are the following varieties, viz. the round, red or purple topped turnip, the green topped turnip, the yellow turnip, the black rooted turnip, and the early Dutch turnip. The laſt ſort is commonly ſown early in the ſpring, to ſupply the markets in May and June, but is never cultivated for a general crop. The red rooted turnip was formerly more cultivated in England than at preſent; for ſince the large green topped turnip has been introduced, all the ſkilful farmers prefer it to the other ſorts; the roots of the green will grow to a large ſize, and continue good much longer than the other ſorts. The next to this is the red or purple topped turnip, which will alſo grow large, and is extremely good for ſome time; but the roots of this will become ſtringy much ſooner than thoſe of the green topped. The long rooted turnip, the yellow turnip, and the blackiſh rooted turnip, are now rarely cultivated in England, neither of them being ſo good for the table or for ſeed, as the red and green topped turnip, though there are ſome few perſon who ſow them for the ſake of variety.

The French turnip is not much cultivated in England, but in France and Holland they are in great eſteem, eſpecially for ſoups; their roots being ſmall, are boiled whole in the ſoup, and ſo ſerved up to the table; theſe muſt be uſed while they are young, otherwiſe they will become rank and ſtringy.

Theſe are ſuppoſed to be only varieties, which have accidentally been obtained from ſeeds, therefore I have not enumerated them as diſtinct ſpecies; but yet I am certain they are conſtant, where care is taken in the ſaving of their ſeeds not to ſuffer any mixture to ſtand for ſeeds: I have ſown of three or four ſorts ſeveral years, and have always found them retain their differences; however, it is not eaſy to determine if ſome of theſe were not by culture firſt obtained from ſeeds of the common white turnip. The yellow turnip ſeems moſt unlikely to have been an accidental variety, for I have never known this alter, and the roots are yellow within, whereas all the other have white fleſh, notwithſtanding their outſides are of very different colours.

The long rooted turnip is, I think, a diſtinct ſpecies, the form of the root, and its manner of growth being totally different from the other ſorts. I have ſeen theſe roots as long as thoſe of the parſnip, and nearly of the

ſame ſhape; theſe run deep into the ground, ſo are unfit for feeding of cattle; and unleſs they are uſed very young, become ſtrong, ſo not proper for the table, which has occaſioned their being rejected of late years.

The green topped turnip grows above ground more than any of the other, which renders it preferable for feeding of cattle; and being the ſofteſt and ſweeteſt root when grown large of any of the kinds, is moſt eſteemed for the table; but in very ſevere winters they are in greater danger of ſuffering by froſt, than thoſe whoſe roots lie more in the ground, eſpecially if they are not covered by ſnow; for when they are frequently hard frozen and thawed, it cauſes them to rot ſooner than thoſe whoſe fleſh is leſs tender and ſweet. I have ſeen the roots of this ſort, which were more than a foot diameter, boiled, and were as ſweet and tender, as any of the ſmalleſt roots.

Turnips delight in a light, ſandy, loamy ſoil, which muſt not be rich; for in a rich ſoil they grow rank and are ſticky, but if it be moiſt they will thrive the better in ſummer, eſpecially in freſh land, where they are always ſweeter then upon an old worn-out or a rich ſoil.

The common ſeaſon for ſowing of turnips, is any time from the beginning of June to the middle of Auguſt, or a little later; though it is not adviſable to ſow them much after, becauſe, if the autumn ſhould not prove very mild, they will not have time to apple before winter, nor will the roots of thoſe which are ſown after the middle of July, grow very large, unleſs the froſt keeps off long in autumn. But, notwithſtanding this is the general ſeaſon in which the greateſt part of turnips are ſown in the country, yet, about London, they are ſown ſucceſſively from March to Auguſt, by thoſe who propagate them to ſupply the markets with their roots; but there is a great hazard of loſing thoſe which are ſown early in the year, if the ſeaſon ſhould prove dry, by the fly, which will devour whole fields of this plant while young; ſo that where a ſmall quantity for the ſupply of a family is wanted, it will be abſolutely neceſſary to water them in dry weather; and where a perſon ſows thoſe ſeeds in April and May, it ſhould always be upon a moiſt ſoil, otherwiſe they ſeldom come to good, the heat of the weather at that ſeaſon being too great for them upon a dry ſoil; but thoſe which are ſown towards the middle or latter end of June, commonly receive ſome refreſhing ſhowers to bring them forward; without which, it is very common to have them all deſtroyed.

Theſe ſeeds ſhould always be ſown upon an open ſpot of ground; for if they are near hedges, walls, buildings, or trees, they will draw up, and be very long topped, but their roots will not grow to any ſize.

They are ſown in great plenty in the fields near London, not only for the uſe of the kitchen, but for food for cattle in winter, when there is a ſcarcity of other food; and this way is become a great improvement to barren ſandy lands, particularly in Norfolk, where, by the culture of turnips, many perſons have doubled the yearly value of their ground.

The land upon which this ſeed is ſown, ſhould be ploughed in April, and twy-fallowed in May, that is once more ploughed and twice well harrowed, and made very fine; then the ſeed ſhould be ſown pretty thin; for it being ſmall, a little will ſow a large piece of ground; one pound is the common allowance for an acre of land. The ſeed muſt be harrowed in as ſoon as it is ſown, with a ſhort-tined harrow, and the ground rolled with a wooden roll, to break the clods, and make the ſurface even. In ten days or a fortnight after ſowing, the plants will come up; at which time, if the ſeaſon ſhould prove dry, they will be in great danger of being deſtroyed by the fly; but if it ſo happen, the ground muſt be ſowed again, for the ſeed being cheap, the chief expence is the labour; but the ground ſhould be firſt harrowed to looſen it, eſpecially if it is ſtiff land.

When the plants have got four or five leaves, they ſhould be hoed to deſtroy the weeds, and to cut up the plants where they are too thick, leaving the remaining ones about ſix or eight inches aſunder each way, which will be room enough for the plants to ſtand for the firſt hoeing; the ſooner this is performed, when the plants have four leaves, the better they will thrive; but in the ſecond hoeing, which muſt be performed about a month after the firſt, they ſhould be cut up, ſo as that the remaining plants may ſtand fourteen or ſixteen inches diſtance, or more, eſpecially if they are deſigned for feeding of cattle; for where the plants are allowed a good diſtance, the roots will be proportionably large; ſo that what is loſt in number, will be over-gained by their bulk, which is what I have often obſerved. But in ſuch places where they are ſown for the uſe of the kitchen, they need not be left at a greater diſtance than ten inches or a foot, becauſe large roots are not ſo generally eſteemed for the table.

It is not many years ſince the practice of ſowing turnips for feeding of cattle, has been of general uſe; how it happened that this improvement ſhould have been ſo long neglected in every part of Europe, is not eaſily to determine, ſince it is very plain, that this piece of huſbandry was known to the ancients. For Columella, in treating of the ſeveral kinds of vegetables which are proper for the fields, recommends the cultivating rape in plenty; becauſe, ſays he, thoſe roots which are not wanted for the table, will be eaten by the cattle: yet this plant was not much cultivated in the fields till within the laſt ſixty or ſeventy years; nor is the true method of cultivating turnips yet known, or at leaſt not practiſed, in ſome of the diſtant counties of England, at this time. For in many places the ſeed is ſown with barley in the ſpring, and thoſe plants which come up, and live till the barley is cut, produce a little green for the ſheep to pick up, but never have any roots. In other places, where the turnip ſeed is ſown by itſelf, the method of hoeing them is not underſtood; ſo that weeds and turnips are permitted to grow together; and where the turnips come up thick in patches, they are never thinned, ſo that they draw up to have long leaves, but never can have good roots, which is the principal part of the plant, therefore ſhould be chiefly attended to.

The general method now practiſed in England, for cultivating this plant in the fields, is the ſame as is practiſed by the farming gardeners, who ſupply the London markets with theſe roots, and is the ſame as before directed. But it is only within the compaſs of a few years, that the country people have been acquainted with the method of hoeing them; ſo that the farmers formerly employed gardeners, who had been bred up in the kitchen gardens, to perform this work; but it is now performed by many country labourers, by which means that practice is loſt to the kitchen gardeners; the labourers doing it much cheaper.

There has alſo been another method practiſed very late-

ly, by ſome very curious farmers, in cultivating of turnips, which is by ſowing the ſeed in rows, with the drill-plough. In ſome places the rows a ſown three feet aſunder, in others four, in ſome five, and ſome ſix. The latter has been recommended by ſome, as the moſt proper diſtance; and although the intervals are ſo large, yet the crop produced on an acre has been much greater than upon the ſame quantity of land, where the rows have been but half this diſtance; and upon the fields which have been tilled, the crops have greatly exceeded thoſe which have been hand-hoed. The late lord viſcount Townſhend was at the expence of making the trial of theſe two different methods of huſbandry, with the greateſt care, by equally dividing the ſame fields into different lands, which were alternately ſown in drills, and the intermediate lands in broad-caſt. The latter were hoed by hand, in the common method, and the other cultivated by the hoeing-plough; and when the roots were fully grown, his lordſhip had an equal quantity of land, which had been ſowed in different methods, meaſured, and the roots drawn up and weighed; thoſe roots which had been cultivated by the plough, were ſo much larger than the other, that the crop of one acre weighed a ton and half more than that of an acre in the other huſbandry.

But when the turnips are ſown in drills, they will require to be hoed by hand, to ſeparate and cut out the plants, where they are too near together in the rows; as alſo to cut up the weeds between the plants, where the plough cannot reach them. If this is carefully performed, the ploughing of the intervals will encourage the growth of the roots, by thus ſtirring of the ground, and make it much better prepared for the crop of barley, or whatever elſe is ſown, the following ſpring. This method of culture may be ſuppoſed to be more expenſive than that commonly practiſed, by thoſe unacquainted with it; but thoſe who have made trial of both, find the horſe-hoeing to be much the cheapeſt, and by far the beſt. For the country people, who are employed in hand-hoeing of turnips, are very apt to hurry over their work, ſo that half the weeds are left growing, and the plants are ſeldom ſingled out ſo well as they ſhould be; nor are they curious enough to diſtinguiſh the charlock, which is one of the moſt common weeds in arable land, from the turnips; ſo that about the middle of September, it is very common to ſee the fields of turnips full of the yellow flowers of the charlock. Now, in the horſe-hoeing, all the weeds in the intervals will be entirely deſtroyed; ſo that if a few plants in the rows of turnips ſhould be overlooked, they may be eaſily drawn when they appear viſible, and by this method the land will be ſooner and better cleaned from weeds.

The greateſt evil which attends a crop of turnips, is that of their being deſtroyed by the fly, which uſually happens ſoon after the plants come above-ground, or while they are in the ſeed-leaf; for, after they have put out their rough leaves pretty ſtrong, they will be paſt this danger. This always happens in dry weather; ſo that, if there ſhould be rain when the turnips come up, they will grow ſo faſt, as to be in a few days out of danger from the fly; and it hath been found, that thoſe, which have been ſown in drills, have eſcaped the fly much better than thoſe ſown in broad-caſt; but, if ſoot is ſown along the ſurface of each drill, it will be of great ſervice to keep off the fly, and a ſmall quantity of it will be ſufficient for a large field, where the drills only are to be covered.

Another danger of the crops being deſtroyed is from the caterpillars, which very often attack them, when they are grown ſo large as to have ſix or eight leaves on a plant. The ſureſt method of deſtroying theſe inſects, is to turn a large parcel of poultry into the field, which ſhould be kept hungry, and turned early in the morning into the field; theſe fowls will ſoon devour the inſects, and clear the turnips. To this evil the turnips, which are ſown in drills, are not ſo much expoſed; for as the ground between the rows will be kept ſtirred, the plants will be kept growing, ſo will not be in danger of ſuffering from theſe inſects, for the parent inſects never depoſit their eggs upon any plants which are in health; but as ſoon as they are ſtinted, they are immediately covered with the eggs of theſe inſects; and this holds in general with vegetables as with animals, who are ſeldom attacked by vermin when they are in perfect health; whereas, when they become unhealthy, they are ſoon overſpread with them; ſo that it is the diſeaſe which occaſions the vermin, and not the vermin the diſeaſe, as is commonly imagined.

When the turnips are ſown in drills, it will be the beſt way to plough between every other row at firſt, and ſome time after to plough the alternate intervals, by which method the plants will receive more benefit from the often ſtirring the ground than they would do, if all the intervals were hoed at one time; and the plants will be in leſs danger of ſuffering from the earth being thrown up too high on ſome rows, while others may be left too bare of earth; but, when the earth has been thrown up on one ſide of the drill, it may be turned down again ſoon after the next interval is ploughed. This alternate moving of the earth will prepare the ground very well for the ſucceeding crop, and greatly improve the turnips; but, as the plough cannot well be drawn nearer to the drills than two or three inches, the remaining ground ſhould be forked to looſen the parts, and make way for the fibres of the roots to ſtrike out into the intervals; otherwiſe, if the land is ſtrong, it will become ſo hard in thoſe places which are not ſtirred, as to ſtint the growth of the turnips. This may be done at a ſmall expence; a good hand will perform a great deal of this work in a day, and, whoever will make the trial, will find their account in practiſing it, eſpecially on all ſtrong land, where the turnips are much more liable to ſuffer from the binding of the ground, than they will be on a looſe ſoil; but yet, in all ſorts of ground, it will be of great ſervice to practiſe this.

When the ground is thus ſtirred in every part, one ploughing will be ſufficient, after the turnips are eaten, for the ſowing of barley, or any other crop; ſo that there will be an advantage in this, when the turnips are kept late on the ground, as will often be the caſe, eſpecially when they are cultivated for feeding of ewes, becauſe it is often the middle of April before the ground will be cleared; for the late feed in the ſpring, before the natural graſs comes up, is the moſt wanted, where numbers of ſheep or ewes are maintained, and one acre of turnips will afford more feed than fifty acres of the beſt paſture at that ſeaſon.

In Norfolk and ſome other countries they cultivate great quantities of turnips for feeding of black cattle, which turn to great advantage to their farms, for hereby they procure a good dreſſing for their land; ſo that they have extraordinary good crops of barley upon thoſe lands,

which would not have been worth the ploughing, if it had not been thus huſbanded.

When the turnips are fed off the ground, the cattle ſhould not be ſuffered to run over too much of the ground; for, if they are not confined by hurdles to as much as is ſufficient for them one day, the cattle will ſpoil three times the quantity of turnips as they can eat, ſo that it is very bad huſbandry to give them too much room: therefore the hurdles ſhould be every day removed forward, and if the turnips are drawn out of the ground before the cattle or ſheep are turned into the new incloſure, there will be leſs waſte made, for they will then eat up the whole roots; whereas, if they are turned upon the turnips growing, they will ſcoop the roots, and leave the rinds, which being hollow, the urine of the ſheep will lodge in them; ſo that, when they are forked out of the ground, the ſheep will not eat any of thoſe roots which are thus tainted.

I cannot omit taking notice of a common miſtake, which has generally prevailed with perſons who have not been well informed to the contrary, which is in relation to the mutton which is fatted with turnips, moſt people believing it to be rank and ill taſted; whereas it is a known fact, that the beſt mutton this country affords is all fatted on turnips, and that rank mutton, whoſe fat is yellow, is what the low marſhy lands of Lincolnſhire, and other rank paſtures, produce.

In order to ſave good turnip ſeeds, you ſhould tranſplant ſome of the faireſt roots in February, placing them at leaſt two feet aſunder each way, obſerving to keep the ground clear from weeds, until the turnips have ſpread ſo as to cover the ground, when they will prevent the weeds from growing. When the pods are formed, you ſhould carefully guard them againſt the birds, otherwiſe they will devour it, eſpecially when it is near ripe; at which time you ſhould either ſhoot the birds as they alight upon the ſeed, or lay ſome bird-limed twigs upon it, whereby ſome of them will be caught; and, if they are permitted to remain ſome time, and afterwards turned looſe, they will prevent the birds from coming thither again for ſome time, as I have experienced. When the ſeed is ripe it ſhould be cut up, and ſpread to dry in the ſun; after which it may be threſhed out, and preſerved for uſe.

There have been many receipts for preventing the fly taking turnips, but few of them deſerve notice; therefore I ſhall only mention two or three which I have ſeen tried with ſucceſs. The firſt was ſteeping the ſeeds in water with flour of brimſtone mixed, ſo as to make it ſtrong of the brimſtone: another was ſteeping it in water with a quantity of the juice of horſe-aloes mixed, both which have been found of uſe. The ſowing of ſoot or tobacco-duſt over the young plants, as ſoon as they appear above ground, has alſo been found very ſerviceable: in ſhort, whatever will add vigour to the young plants, will prevent their being deſtroyed by the fly, for thoſe never attack them, till they are ſtinted in the growth. *Miller's Gard. Dict.*

Mr. Liſle is inclined to think, that the beſt way to manage turnips, the ſeed of which, ſays he, is impatient of growth, and apt to burſt in too much wet, as alſo to corrupt, if the ground be ſo dry as only to give it a damp, but not wet enough to ſet it on growing, is, firſt to harrow the ground fine, after it has been brought to a perfect tilth by plowing, then to roll it with a roller big enough to break the little clods, if any ſuch remain, and ſo let it lie till the next rain; then, the ground being mellow, to ſow the ſeed, and harrow it in with ſhort-tined harrows, which may not open the ground too deep, nor bury the ſeed; then roll it again with a one-horſe roller, in order to keep the moiſture in the ground as deep as the ſeed may be: for the ſurface of the earth muſt not be dried before the ſeed can ſtrike root, which may be in twice twenty-four hours; and yet that ſurface muſt be ſo fine, and ſo lightly compreſſed, that the ſeed may ſpear through it. He takes the myſtery, as he calls it, of the ſucceſs or miſcarriage of a crop of turnips to conſiſt in theſe four things, viz. firſt, in the ſeeds not lying too deep; ſecondly, in its not lying too wet, which it cannot eaſily do if harrowed in ſhallow, for the ſurface of the earth is ſoon dry; thirdly, in its not lying too dry; and fourthly, in its lying in a fine bed. In another place, he tells us, that his gardener affirmed to him, that he had found turnip-ſeeds, which had been dropped by accident and covered over with earth in digging, freſh and good a year after, when the earth was turned back again, and that it has then grown and produced good turnips. The reaſon is, that every ſeed which is buried ſo deep as not to be affected by the changes in the air, may remain in a ſound ſtate, and in a fit condition to vegetate, for many years, as hath been evinced by numbers of inſtances.

Mr. Duhamel adviſes after the two firſt hoings, a ſlight ploughing all over the field, with a plough that has no fins to the ſhare, as a ſpeedier and cheaper way to thin the plants; the turnips will not require any farther care. They will have attained their full ſize in October, before the froſts come, and ſhould then be taken up, ſtripped of their leaves, which may be given to cattle, and laid upon hurdles in a dry place, with a layer of dry ſand between each layer of turnips, which may be thus piled up, and which will keep very well in this condition, for the food of cattle during the winter. In Norfolk, they ſtow them in their barns, when intended for fattening of bullocks.

A dry ſeaſon is the beſt for hoeing turnips, becauſe neither the weeds nor the turnips hoed up then will be ſo apt to grow again: and Mr. Liſle ſuppoſes that care ſhould be taken to hoe up thoſe that are deepeſt rooted in the earth, and to leave thoſe that grow upon, and almoſt out of it, without much regarding their ſize; becauſe thoſe which lie on the ground, and have room to grow, will ſoon become the largeſt.

Some ſow turnips on their flax and hemp grounds, at the ſame time as they pluck up thoſe plants, and the ſeed is pretty well buried by the ſtirring thereby given to the earth. Others give their corn ſtubble only a ſlight plowing after harveſt, then ſow the turnips very thin, and harrow in the ſeed. Theſe methods do very well when the ground is in good tilth. Others again, ſow late turnips, merely for the ſake of their leaves, which they uſe as green feed, when they are about a foot high; and in this caſe they ſow the ſeed very thick.

An eaſy way to have two growths of turnips in the ſame field, is to ſow ſeed of the laſt gathering, and ſeed that is two years old; for this laſt is longer before it riſes, than the new: and an advantage attending this method, is, that the turnips, by riſing at different times, will have the better chance to eſcape the fly, or grub, which ſometimes deſtroy them entirely: for it has been obſerved, that theſe flies often come ſuddenly in great ſwarms, and eat up the

turnips

turnips as fast as they riſe; and that they ſometimes diſappear as ſuddenly; ſo that the turnips which riſe a few days after, in a neighbouring field, are not at all injured by them: conſequently, when the turnips of the ſame field riſe at different times, one or other may eſcape the ravage of theſe inſects; for they deſtroy them only while in their ſeed leaf.

The worm to which turnips are very liable may be guarded againſt, or at leaſt in a great meaſure, as Mr. Liſle informs us, by liming the ground. This will alſo render them much ſweeter than they would otherwiſe be: and we are of opinion that freſh ſlaked lime ſtrewed over the ground when the turnip ſeed is ſown, will contribute greatly to preſerve the young plants from the fly. It is to the worm lodged in the root of the turnip, perhaps engendered from the egg of the fly, that Mr. Liſle imputes the diſtemper or diſeaſe in turnips, which the Norfolk farmers call the hanbery; ſo named from a like diſtemper in a horſe's heel. It is a watery excreſcence, formed probably by this inſect, in the ſame manner as galls are formed upon the leaves of the oak. In ſome years it takes off whole crops, and the turnips never thrive after it has begun to grow in them.

A gentleman, remarkable, among many other good qualities, for ſeveral excellent improvements which he has made in agriculture, tried with ſucceſs the following experiment, to preſerve turnips from the fly, and the better to ſecure their growth. He ſowed the ſeed in a nurſery, where there was leaſt danger of ſlugs or the fly, and where they might eaſily be watered in caſe of great drought, to make them grow the quicker. They remained in this nurſery, till they were large enough to be tranſplanted. By this means he gained ſome weeks longer, to perfect his fallow, or give a thorough plowing to ground which had borne a crop that ſeaſon. He tranſplanted his turnips into the field, and by planting them regularly at due diſtances, greatly leſſened the expence of hoeing; their regularity making it very eaſy to deſtroy the weeds from time to time, as they appeared.

In the ſecond part of the memoirs of the Society of Berne for the year 1762, the reverend Mr. Bertrand, not ſatisfied with even a ſcrupulous diſcharge of the duties of his clerical function, has inſtructed his pariſhioners, his country, and mankind, in the important ſubject of agriculture. The improving of light ſoils by the culture of turnips, is one of his objects: upon which he very judiciouſly obſerves, that though it be right to plough ſtiff lands before the winter, in order to their being mellowed by the froſt; yet as the fineſt and beſt parts of the ſoil will be in danger of being waſhed off, or carried down into the looſe earth underneath, when this is done in a light ground, or in mould which has a ſandy or gravelly bottom; it will be moſt adviſable here, to turn the ſtubble down immediately after the corn has been taken off, and then to ſow turnips; becauſe their ſpreading leaves will ſhelter and ſecure the fine mould upon the ſurface, and keep the land in good heart, whilſt the earth will be looſened and divided by their roots, ſo that it will be rather fitter for a a ſpring crop, than if it had lain uncultivated.

The chief uſe of turnips is, to feed cattle in the winter and ſpring, when there is a want of graſs for their paſture. Cows, oxen, and hogs, are very fond of this food, which fattens them, and increaſes the milk of the former. Sheep too eat it readily, and thrive upon it, when they have been uſed to it early, but they do not reliſh it when it has not been offered them till they are grown old: however, if they are kept faſting two or three days, moſt of them take to it, and when they have once taſted it, they become very fond of, and feed kindly upon it. In ſome places, they feed their lambs with turnips till the middle of April, though they then begin to run up to ſeed. Farmers chooſe rather to do this, than to let them hurt their clover, ſainfoin, lucern, &c. Some parboil them a little, at firſt, till their cattle, and particularly their ſheep, are accuſtomed to them: but a lamb only three weeks old, will, after it has once eaten of this food, ſcoop out a raw turnip with great glee.

Turnips, if not clean eaten, and well cleared off the ground, may take root again, run to ſeed, and do great damage to the enſuing crop. Mr. Liſles inſtances it in a gentleman of Berkſhire, who ploughed up a turnip field in the ſpring, and ſowed it with peas: but the little dwarf turnips that were left behind, uneaten, notwithſtanding his ploughing them up took root again, run to ſeed in great quantities, and did much damage to his crop of peas.

The practice of turning a flock of ſheep, at random, into a large field of turnips, is very bad: for they will then ſpoil more in a fortnight, than would keep them a whole winter. The beſt way, therefore, of feeding them with theſe roots, is, as Mr. Tull adviſes, and after him M. Duhamel, one or other of the three following methods, which are equally applicable to the drill, and to the common huſbandry.

The firſt is, to portion out the turnip ground, by incloſing with hurdles ſo much only as the ſheep can clear in one day; and ſo to advance the folds farther into the field every morning, until all be ſpent. But it is to be obſerved, that the ſheep never eat them clean this way, but take only the leaves and the heart of the turnip: ſo that great part of them remains in the earth. It is true that theſe fragments, if left there, rot, and become a manure: but when they are wanted for the food of the flock, and are to that end pulled up with iron crooks or forks made for this purpoſe, the ſheep do not reliſh, and conſequently eat but little of theſe then dirty withered remains, tainted with their urine, dung, &c. nor can they nouriſh them ſo well as roots which are freſh and cleanly.

The ſecond method differs from the former only in pulling up the turnips ſo far as they are hurdled off, before the ſheep are turned in. They then eat them better, becauſe the food is freſh and in good condition. Beſides, as the whole turnips are pulled up more eaſily than their pieces can be, there is not ſuch waſte as in the other way. The turnips which grow next to the hurdles ſhould be thrown towards the middle of the ſpace hurdled off; becauſe they will be leſs liable to be trampled upon and ſpoiled there, than nearer to the hurdle, where the ſheep run about moſt, in ſearch of means, of eſcaping into the open field.

The third way is to pull up the turnips, and carry them into ſome other ground, and there ſpread them every day on a new place, where the ſheep will eat them up clean. This is done when there is land not far off, which has more need of dung than that where the turnips grow. The expence of carrying the turnips is compenſated by ſaving the price, or at leaſt the carriage and removing of the hurdles: only when the turnips are laid on a ſpot of graſs, as is frequently done in wet weather, the benefit of the dung and urine of the ſheep is loſt.

This method is requiſite when the field on which the turnips grow is wet; becauſe, 1. The ſheep would trample upon, and bury, part of the turnips, which would be loſt. 2. In treading that wet earth, they would poach it, and render it unfit for corn. 3. By this means a field may be dunged, as we have juſt obſerved, which wants it more than that where the turnips grew. 4. This muſt neceſſarily be done, if wheat has been ſown in the alleys between the rows of turnips, according to the principles of the new huſbandry.

Turnips are always carried off the field, when they are intended to fatten the larger ſorts of cattle: and they ſhould be cut in pieces for them, leſt they choak themſelves with the whole ones. They are given morning and evening to ſtall-fed cattle, which in the intervals, eat likewiſe common fodder; but the turnips increaſe their appetite to ſuch a degree, that a middle ſized bullock, ſtalled for fattening, will conſume near two hundred pounds weight of theſe roots in twenty-four hours, beſides hay: whereas, if nothing but hay were given him, he would hardly eat half the quantity that he will with the turnips. A healthy bullock, in only good plight at the time of his beginning to be fed with turnips, will be very well fattened in three months.

Mr. Tull ſays he found by experience, that the beſt way of ſowing turnips is in ſingle rows, ſix feet aſunder. He ſowed them in double rows alſo at that diſtance, but they did not do well: and he likewiſe ſowed them in ſingle rows, with intervals of only three feet. Theſe laſt yielded a greater crop than a neighbouring field, which was ſown and managed in the common way: but neither the ſingle rows three feet aſunder, nor the double rows with intermediate diſtances of ſix feet, yielded, ſays he, half ſo much, as the ſingle rows ſix feet aſunder: from whence he concludes, that it is beſt to leave a ſpace of ſix feet between the rows; for that, if the alleys are well ploughed, theſe turnips will thrive wonderfully, even though no other moiſture falls but the dew, which will ſink into the earth to their roots.

However, notwithſtanding Mr. Tull's experiment, M. Duhamel is for ſowing turnips in double rows, if the intervals are of ſix feet; or if they are ſown in ſingle rows, he would have theſe rows be but four feet aſunder, which is the ſpace left between the rows of vines in Languedoc, and which is there ploughed with oxen.

Mr. Tull did for ſome time drill his turnip ſeed upon ſix feet ridges, a ſingle row upon the middle of each, and found in this way his crops were better, than on three feet ridges: but upon further experience, he found four feet ridges were more proper than ſix; and at the end of his table of the contents of the horſe-hoeing huſbandry, he writes as follows, viz.

"Thoſe who have the engine (for drilling turnip ſeed) are adviſed to ſow turnips in ſingle rows, on high four feet ridges; but when they are deſigned for ſeed in ſix feet ridges."

Turnips at their firſt coming up, are often deſtroyed by the fly, which eat off the young leaves, the two firſt or ſeed leaves in particular; which deſtroys the turnips. Theſe flies come in ſuch numbers, that large fields of turnips are frequently deſtroyed by them in a day or two; they come ſuddenly and go off in the ſame manner: for which reaſon Mr. Tull contrived to put a braſs ſpout, or tube, to his turnip drill, which carries part of the ſeed ſo far behind the ſhare, that it falls into the furrow, after it is in part filled by the mould: ſo that the ſeed that drops firſt into the furrow lies as deep as the bottom, and what drops from the ſpout lies ſhallower. This may be improved, by making holes in the bottom of the ſpout, or by making the bottom of it of with wire, like a ſcreen; and then the ſeed will drop, and be covered, by the mould, at ſuch different depths, that it will come up at more different times, than if the lower ſide of the ſpout is made ſolid, and diſcharges the ſeed only at the end of it. By this means, and ſowing mixed ſeed, half new, and half old, there will be many chances of its eſcaping the fly.

There is another advantage in drilling the ſeed in this manner, the plants may be thinned by hand, the perſon employed to thin them, taking hold of the ſtrongeſt plants, with the fore finger and thumb of his left hand, may draw up the others with the other hand, without diſplacing, or much diſturbing, the ſtrong plants that are to remain; which is a ſafer way of thinning thoſe plants than with a hand hoe, as Mr. Baker has experienced in thinning his turnips. In this way ſome more ſeed may be drilled upon an acre, than the common allowance of four ounces; for the more gradually the plants come up, they will riſe the more diſtinctly, and at the greater diſtances in the row; and may be the more eaſily ſet out to the diſtances they are to remain for a crop.

If the land is in good heart, a proper ſoil for turnips, and drilled early, a foot aſunder in the rows, is a proper diſtance for large turnips; but in different circumſtances, ten inches diſtance is ſufficient, and four feet intervals between the rows.

Some farmers draw up their turnips late in autumn, and lay them up in ſtore againſt winter. In this way, the turnips are always ready; while thoſe that remain in the field, are ſometimes ſo much frozen, or covered with ſnow, that it is difficult to get them out of the ground when they are wanted.

There is a certain period in the growth of turnips, as in other plants, when they are in the greateſt perfection, and moſt nouriſhing to cattle. Some who have occaſion to buy turnips know this, and reckon that an acre of turnips before Chriſtmas, will fatten as many ſheep, as an acre and a half, of the ſame turnips, after Chriſtmaſs. The principal reaſon why the farmers do not uſe them till winter and ſpring, has been the ſcarcity of food for their cattle at that time; but now they are not ſo much at a loſs in that reſpect as formerly; as ſeveral plants lately introduced, do fully ſupply cattle in the room of turnips, as carrots, parſnips, cabbages of various kinds, and rape or cole ſeed.

An ounce of ſeed will ſow as much land when drilled, as a pound will in the common way: and if care be taken to diſtribute only the neceſſary quantity, a great deal of trouble will be ſaved in the hoeing of the plants, afterwards, to thin them. But it is eſſential to obſerve, and we muſt again repeat it, that all roots, whether turnips, carrots, parſneps, parſly, or any other, always thrive beſt where there is a great depth of fine, light, well looſened mould. M. Duhamel trenched the whole of his kitchen-garden three feet deep: all his pot-herbs grew very fine, and his roots in particular were of a ſurpriſing ſize.

Mr. Tull, by drilling his turnip ſeeds alternately at different depths in the earth, was ſure to ſucceed in one part or other, whether the ſeaſon was wet or dry. If wet, the ſeed ſlightly covered ſprouted firſt; and in dry ſeaſons, that

that which lay deepeſt was the firſt that roſe. By this means, and by mixing the ſeed, half new and half old, for the new always comes up ſooneſt, he had four comings up, which, as he obſerves, gives the plants ſo many chances to eſcape the fly.

If one was ſure of having rain immediately after the turnips are ſown, it would undoubtedly be right to ſow them very ſhallow: but if no rain happens, they are beſt deeper in the earth, becauſe they there meet with moiſture ſufficient to make them grow.

When the ſeaſon has been ſo kindly that all the ſeeds have grown, and the plants have not ſuffered by the fly or other inſects, they muſt be thinned early, that the ground may not be exhauſted by ſuch as are not intended to remain; for thoſe that are left ſhould be about a foot aſunder.

When the turnips ſown in drills thrive well, only each alternate alley need be hoed at one time, and the others a few days after; it being better to feed the plants gradually, by dividing the hoeings in this manner, than to give them a great deal of food at once, by hoeing all the alleys together, and afterwards leave them double the time without any culture at all. Another advantage attending this method is, that the plants will be the leſs liable to be killed by hot dry weather, and the leſs apt to be damaged by heavy rains. But it will not, indeed, ſo effectually deſtroy weeds, which ought always to be a principal object of the huſbandman's care, and which ever is one of the chief intentions of the New Huſbandry. However, as all weeds are very apparent in the alleys, it is eaſy to extirpate them there; and as to thoſe which may chance to be in the rows, the perſons who thins the turnips may cut them up at the ſame time. He will there moſt eaſily diſtinguiſh the charlock from the turnips, eſpecially when the leaves of theſe laſt are come to be about the breadth of a half crown.

All plants ſown in ſingle rows are greatly benefited by the alternate hoeing of the alleys between them: for, as M. Duhamel obſerves, 1. Four of theſe hoeings, which coſt no more than two intire ones, are almoſt as beneficial to the plants as four complete hoeings. 2. A plant which finds a great deal of nouriſhment on one ſide, is the better able to thrive without receiving ſo much on the other. 3. If, in hoeing very near the plant, ſome of its roots are broke; thoſe on the other ſide, not hoed, ſupply the wants of the plant, till the broken ones have made freſh ſhoots 4. The horſe-hoe may therefore be brought very near to the turnips, without fear of hurting them; provided it do not force them out of the earth. 5. When a farmer has a great quantity of turnips to hoe, they are ſooner ſupplied by this culture, than they poſſibly could be if all the allays were to be hoed.

A furrow ſhould not be left open near the turnips, while they are young; becauſe the earth about them would in that caſe become too dry: but there is no danger of this in the autumn, when they are grown ſtrong, and the earth is moiſt. Neither is it adviſable to leave a furrow open near them during the winter; becauſe they would be in danger of being hurt by the froſt.

When theſe plants are grown large, and their roots are conſequently pretty well extended, the hoe-plough need not come quite ſo near them as at firſt: nor is it neceſſary to hoe them at all, till they are about the bigneſs of one's finger's end.

One alternate hoeing, or which is the ſame thing, two half hoeings, will be ſufficient when the turnips are ſown late. But when they are ſown early, and many weeds grow, one hoeing will not be enough.

By following this culture, M. Duhamel has ſeen turnips which weighed from ſixteen to nineteen pounds; and we may depend on their weighing one with another twelve pounds a-piece in a good ſoil, which is a vaſt produce from an acre of land. Mr. Miller ſays, that one acre of turnips, thus properly cultivated, will afford more feed for ſheep or ewes in the winter, than fifty acres of the beſt paſture at that ſeaſon.

Another vaſt advantage which attends the ſowing of turnips in rows, is, that inſtead of occupying the whole ground when it ſhould be ſowed with wheat, and ſometimes even when it ſhould be ſown with ſpring-corn, as is frequently the caſe in the old way; they are no hindrance to either in the New Huſbandry: for as the alleys are in good tilth, three rows of corn may be ſown, ſeven inches aſunder, between the rows of turnips; and when theſe roots are pulled up, the ground where they grew is hoed, and becomes the alleys between the beds of corn.

The beſt turnip ſeeds are obtained from the largeſt roots, which may be either tranſplanted for that purpoſe, or marked out in the field where they were ſown. Thoſe which are commonly ſold in the ſhops, ſeldom produce the fineſt plants.

Experiments on Turnips cultivated according to the New Huſbandry.

In 1754, M. de Chateauvieux ſowed turnips on beds, in two rows. They ſuffered greatly for want of rain, and none of them grew to the ſize they would have done in a more favourable ſeaſon. Some of them weighed eight pounds; but their general weight was from three to four.

In 1755, M. de Chateauviex ſowed ſome beds with one row, ſome with two, and others with three rows. They were afterwards thinned, ſo that the plants ſtood a foot aſunder in the rows. Thoſe ſown in one row were the largeſt, and, in general, the moſt equal. Some of them weighed fourteen pounds, and moſt of them from ſeven to eight. In the other rows, they did not weigh ſo much; but they were more numerous.

In conſequence of theſe experiments, M. Duhamel, to whom they were communicated, makes the following ſtriking calculation relative to the quantity of food which turnips will afford for cattle.

"Let a ſquare whoſe ſide is 216 feet be formed into beds four feet wide, which is ſufficient for one row of turnips. Theſe will be 216 feet long, and conſequently will contain that number of turnips, planted a foot aſunder. Theſe 216 multiplied by 54, the number of beds, will give 11664 turnips for the product of the ſquare; and theſe multiplied by ſix, the ſuppoſed weight of each turnip, will give 69,984 pounds for the weight of all the turnips on this ſpot."

This may be looked upon as a very conſiderable crop; for it will be ſufficient to ſtall-feed four bullocks during the three winter months, at the daily allowance of 200 pounds each: and yet there is reaſon to believe that the quantity will be doubled in a good year, as will be pretty evident to thoſe who conſider at how low a rate the medium weight of the turnips is here eſtimated.

In 1755, M. Duhamel ſowed turnips in a field, on beds cultivated with the horſe-hoe. They grew extremely fine; many of them being twenty-nine inches circumference.

The following Account of the Advantages of the Drill Husbandry in the Culture of Turnips, was sent by Mr. Willy, of South-Petherton, to the Society for the Encouragement of Arts, &c.

The generous method you have taken to promote useful knowledge must give every lover of his country the greatest pleasure, and incline him to do all in his power to increase it; it is with this view, and by the persuasion of many friends, I presume to lay before you the following lines, hoping they may give you some satisfaction in respect to the difference betwixt the Old and New Husbandry.

I began husbandry in the year 1742, had always an inclination to drilling, and was at much trouble and expence in getting one instrument after another made for the purpose; but was often disappointed, and for some years was forced to lay by the thoughts of it. About eight years since a gentleman lent me Mr. Tull's treatise; I then got some new instruments made, which sowed very regularly, and since that time have sowed all my corn in rows. Several closes I ploughed in six furrow ridges, and sowed with three rows of wheat, plowing the intervals with a small sull, drawn by one horse, and made it fit for wheat the next year; it generally took one third of the common quantity of seed, and in two years it yielded more than half as much again as the best crops in the common way did in one year; which, considering the small expence of seed and labour, was some advantage, though not very great; but then it left the ground in very good order for the next crop of spring corn. I kept one close, about two acres, four years to wheat in the same method; but the two last years did not answer to the two first, which makes me think Mr. Tull wrong, when he says, that plants of different natures are nourished by the same sort of food. I could give an account of the exact quantity produced in each year, but it would be tedious: upon the whole, I believe this method of sowing wheat will be of no advantage except in poor strong clays, where I apprehend it must exceed all others. But there are a few inconveniencies attending it; frequent ploughing the intervals is apt to make the wheat shoot fresh ears, which do not ripen with the others; and if any of the full ears when near ripe do but touch the fresh ploughed earth, ever so little wet will make them sprout, and these will injure the whole crop; and I find it impossible to keep all up, as the rows are at so great a distance. But my method of drilling in the open fields, and which I intend to follow, is to put five rows about eight inches apart, on a ridge about five feet in breadth. This takes but two-thirds of the seed sowed in the common way, and has always produced a better crop than the lands on each side of mine; this my neighbours are now convinced of, and several of them have drilled their wheat this season: our soil, for the most part, is a deep heavy sand.

I apprehend the principal advantage in drilling wheat is placing it at a proper depth, which I think is within two inches or thereabouts. I have observed, that the first motion of the wheat is by some roots, which in a little time run very deep; then it shoots up its blade; next it begins to form a head, about an inch under ground, from which come (very soon in a mild season) the second and third blades; and after this it begins to shoot fresh roots and branches from this same head, till in time it grows very large, especially in a fruitful soil and a good season; and it keeps on shooting fresh roots all the growing season: now if the corn is too deep, and a severe frost happens while this head is forming, the plant is quite destroyed: but if it lies shallow, it shoots a new blade from the corn, and goes on in its operations as before; this was the case in 1763, a severe frost happened in the night of the thirteenth of February, which destroyed a good deal of wheat; so that some which lay deepest was ploughed up, and sown with other seed in the spring. Last year multitudes of plants were killed in the same manner, and brought the crop very thin. In short, I am very certain, that whoever will make their observations will find that what I have said is the truth, That the shalloweſt corn will flourish sooner and better, and from thence will be led to see the advantage of drilling wheat.

But although I intend leaving Mr. Tull's method of sowing wheat, yet I hope always to follow it in beans and turnips.

My beans I have sown these four years in double rows, about ten inches a part, and about two feet intervals. These I plough from and to the beans, when about six inches high; this is done with a little sull drawn by one horse, and will plough three acres in a day. This method hath succeeded so well, that many are come into it; although the farmers have always an aversion to new methods of managing; we sow but one-third of the seed, and have a much better crop, as is allowed by all.

As for turnips, all my neighbours will allow the drill to beat every thing. I sow a double row about eight inches wide, on a ridge about five feet, and though I did not sow this year till August, I have turnips two feet round, after wheat. I have given them but one ploughing as yet, besides hoeing them out at proper distances. I believe all will acknowledge I have double the crop in weight with any sown in the old way. I left four intervals unploughed in one close, to see the difference, and it is very surprising. One of my neighbours was prevailed on to sow a few rows in a piece he was sowing, and let my man plough them. The difference is so great that he is become an advocate for the drill husbandry; indeed I do believe that it will soon make its way through all the prejudices of the old farmers to the contrary; especially as we have a drill invented by an ingenious carpenter, with which several farmers have sown beans, pease, turnips and wheat, and it answers exceedingly.

For these seventeen or eighteen years past, I have been striving to improve a crop of turnips. Before this, nothing was known or aimed at hereabouts, but sowing in the common way, one pound of seed on an acre; and then come thick, come thin, weeds and all grew together, till the sheep were turned into eat the crop as it was, and generally it was very poor.

The first improvement I made was by Ellis's direction, to drag them well with heavy harrows till they were got pretty thin, by which method I soon got better crops than any about me. But then I sowed double the quantity of seed, that I might have sufficient stock of plants for my after husbandry. My neighbours were soon convinced of the advantage of this, and followed my example, which is now the common practice. After this, finding the thinnest was best, I got some hoed; this I found still better, but very expensive, our people being not used to it. I tried Mr. Ellis's receipt to prevent the fly from destroying the young plants, but my ploughmen refused to sow the seed when mixed with sulphur. I then invented a long box, made

teade full of holes, for the ſeed to fall through, and faſwned it to two wheels ſo as to keep it above ground; this ment ſo light that a boy could draw it, and ſowed the ſeed very regularly. I ſhewed this to a friend of mine, (Mr. Joſeph Pittfield, of Sidland in Dorſet) who had one made immediately; and ſoon made an improvement on it, by having the holes made in rows about a foot aſunder. Finding that the plants could be thinned and cleared at a much leſs expence, I followed this method of ſowing for myſelf, as did ſome of my neighbours, for ſome years, and with a deal of ſatisfaction. A few years ſince, I was willing to try what ſtirring the ground deeper would do; and being reſolved to try the drill huſbandry in corn likewiſe, I had a ſmall ſull made, with which one horſe will plough more than two acres in a day, firſt turning four or five inches deep from the plants, and then back to them again: we generally ſow turnips after wheat, peaſe, and flax, and my method is to plough the ground into ſix furrow ridges, which with the open furrow makes about five feet in breadth. On ſuch a ridge I ſow (out of a ſhort box) two rows of ſeed, though ſometimes but one, and harrow it in with a very light harrow. When they have four or five leaves I get them thinned, and give them a ploughing; and ſome time after, when they begin to kern, I have them thinned and cleaned again: and this is all the huſbandry I have hitherto beſtowed, and all I think is neceſſary, as we do not ſow till late; the coſt of which is about three ſhillings *per* acre.

I have ſown ſome betwixt rows of beans, and they anſwered very well: when the beans were pulled, I had the plants thinned and cleaned, and the earth ploughed betwixt the rows.

The firſt I ſowed laſt year was a ſmall piece about half an acre, where hemp failed; I had the ground ridged up, and ſowed with two rows of ſeed, and managed, as I ſaid before: indeed the ground was dunged for the hemp. This was ſown the latter end of July, but did not come up till the middle of Auguſt, for the want of rain. I pulled them before Chriſtmas, and had fifteen putt loads, which every one will acknowledge to be a good crop; I believe double a common one; and though the rows were four feet apart, the leaves touched each other. The next I ſowed was after wheat, about the middle of Auguſt: when the wheat was carried off, I had the ground ploughed into ridges where the old furrows were, and ſowed one row of ſeed on each ridge: theſe coſt but little in thinning and cleaning, and once ploughing, and were a very good crop: the largeſt of them was more than two feet round, and weighed above ſix pounds; indeed towards the hedges they were much ſmaller; I had fifteen putt loads per acre, though the ground had bore three crops ſince it was dunged. Another piece of two acres I ſowed after peas, in double rows; but not till the latter end of Auguſt: I had the ground ridged up, and when the plants were fit, I had them thinned and cleaned as uſual, but left four ridges for ploughing to ſee the difference; and truly it was ſurprizing: thoſe that were ploughed were more than three times as large, though they had all the ſame huſbandry, except ploughing. They are as good a crop as the wheat ſtubble, though ſown later, which makes me think double rows are beſt: our ſoil is moſtly heavy good ſand.

We have reſerved for this article the following account of ſeveral very important experiments made by Mr. John Wynn Baker, under the direction of the Dublin Society, and publiſhed at their requeſt, on the culture of cabbages, the turnip-cabbage, boorcole, and turnips, by various methods; with an accurate ſtate of the produce; and of the abſolute and comparative advantages of each in feeding ſheep and horned cattle. *See the articles* BOORCOLE-CABBAGE, POTATOES, and TURNIP-CABBAGE.

In the month of March, 1763, two acres of ground, very highly manured with dung, were planted with potatoes, in the manner uſually practiſed in this kingdom, with ſpade and ſhovel; in the beginning of November following the potatoes were dug. The land being low, and the winter very wet, it could not be plowed until the beginning of March, 1764; when, it ſhould be obſerved, the under ſtratum, upon which the dung and potatoes lay, roſe at the plowing as ſtubborn and ſtrong, as if no part of the ground had been tilled before: which proves the potatoe tillage, in the manner in which it is uſually practiſed, not to be ſo beneficial to land as is generally imagined: the fact being, that only about thirty inches in every nine feet of the ground is tilled at all.

In the night of the 10th, and on the 11th and 12th, of May following, there was very fine rain; this rain enabled me, on the 12th, to reduce this ſtubborn ground pretty fine by the harrow.

In the month of March, 1763, the other part of this field was broke for fallow (an improper time to break fallows; but, my entrance upon the farm in that month was the cauſe); in June following it was croſs ploughed, which brought it into very large lumps; from the poſition this ploughing threw them into, they were expoſed, in a greater number of points, to the influence of the weather, than the ground would have been, had the ſecond ploughing been in the ſame direction as the firſt.

In this ſituation I left this fallow till the March following; when it was ploughed for the third time, with the potatoe ground, in the ſame direction as at firſt; by this third ploughing this land was brought into an exceeding fine tilth.

This benefit aroſe from the ground not having been harrowed at all. This is ſomething contrary to the common mode of culture; but was adapted to the ſpecies of ground I had to work upon; which I ſhall deſcribe hereafter.

What the harrow would have done in part towards reducing it after the ſecond ploughing, was completely effected by the influence of the ſummer and winter; the firſt deſtroyed all the weeds and couch-graſs (with the latter of which the ground abounded); and the lumps exfoliating by the operation of the winter, by degrees fell into fine mould; whereas, had it been harrowed before the winter, the rains would have run the ſmaller particles together, ſo as to have given a great adheſion to the ground before the ſpring; abſtracted from the like miſchief, which the cattle would have done by drawing the harrow. In the beginning of June, I ploughed this part of the field a fourth time, and the potatoe ground a ſecond; by which ploughing I laid the whole field into ridges of five feet width, except about half an acre, which I reſerved for other purpoſes, as will appear hereafter.

In this field I had two parcels of manure ready prepared for it. One conſiſted of earth raiſed from the headland, mixed with lime, which lay about twelve months, having been in that time twice turned.

The other parcel conſiſted of the like earth, and lime, mixed in the ſame manner, after which I mixed dung with it, *ſtratum ſuper ſtratum*, which lay about two months; when

when I turned it: after which it lay about two months longer: by this ſtirring the ingredients, of which this parcel was compoſed, were perfectly incorporated with each other; and a new putrefactive fermentation was excited in it; which perfectly prepared it for the land: and all the earth was ſo fully impregnated with the juices of the dung, that it was very little, if any thing, inferior or the dung: whereas, when dung lies by itſelf, great part of the volatile ſaline particles are loſt, as ſoon as the fermentation begins: ſome fly off in vapours, and others run off with the juices of the dung and rain, which fall upon it.

When I have mixed dung and earth, in the manner already deſcribed, I always once or twice when the ſeaſon afords it, cover the compoſt with a large quantity of ſnow, or ice: which, upon diſſolving in its paſſage through the whole cauſeth the earth to be finely impregnated by the dung. Snow, by being gathered with ſhovels or rolled together in balls, is longer diſſolving than ice, and therefore I prefer it, unleſs it be ice of water which happens to be the ſoakage of a dung-yard, ſuch ice being always replete with food for vegetables.

The land being now, in June, in five feet ridges, in the manner already deſcribed, I began to draw out my compoſt; which I diſpoſed in the following manner: I drove the cars up every alternate ridge, and upon each of them dropped the compoſt, till I had manured about three acres of the fallow ground; then, with ſhovels, I divided this manure, as equally as could be, in every furrow; which was readily done, from the convenient manner in which it was depoſited.

In the ſame manner I put out the other parcel of manure (which, it may be remembered, I before ſaid conſiſted of lime and earth) upon an acre and a half of the potatoe ground; and on a part of the fallow ground, where no compoſt, or other manure, had been put, and ſpread it in the ſame manner as the former.

The whole field being thus manured, I ploughed it again, which was the fifth ploughing of the fallow, and third of the potatoe ground: by this ploughing I altered the poſition of every ridge, by laying the middle of each exactly over the manure; conſequently the furrows were made, where the middle of the ridges was before.

The half acre before-mentioned I manured with at leaſt double the proportion of compoſt, which was allowed to the other part of the fallow; and as it was flat, it was neceſſary to manure every part of it, being intended for turnips, to be ſown in the promiſcuous way.

To this piece of ground I gave a ſixth ploughing; as it could not have the benefit of the horſe-hoe, when cropped, and therefore I thought it neceſſary to reduce it as fine as poſſible, in order to give the broad-caſt crop of turnips every advantage I could.

The field being prepared in the manner already deſcribed, I proceeded to crop the land in the following order.

July the ſixth and ſeventh, I planted one row of cabbage plants, upon the middle of every ridge, of about an acre of the fallow ground, the plants in the rows two feet from each other. In like manner I planted about half an acre with turnip-cabbage plants.

Hence it may be obſerved, that the plants were in rows five feet aſunder, and two feet aſunder in the rows.

This buſineſs ought to have been done, at leaſt, a month ſooner; but I could not get the ground ready in due time; however, the ſucceſs of theſe crops may encourage others not to give up their expectations, although they may happen to be as late as I was, which muſt frequently occur in the courſe of buſineſs; though this is always to be avoided as much as poſſible.

I never begin to put my plants out till about ſix o'clock in an evening, unleſs I can be ready for planting in a rainy day, which is always to be preferred; in the other caſe, I always keep the men at this work as long as they can ſee. If it can be done in, or immediately after rain, that will ſave the expence of watering the plants; which is an object worthy of attention in a large work of this kind; beſides the circumſtance of the plants ſucceeding much better.

On Friday the ſixth of July we had fine rain, and on the ſeventh I finiſhed. On the eleventh we had ſome light ſhowers, and on the twelfth fine rain, which ſecured life to my plants; but they began to look ſickly before the twelfth; three of the intervening days having been hot and dry.

On the ſeventh I alſo planted three of the five-feet ridges, with one row of boorcole plants on each ridge, the plants in the rows two feet aſunder.

Be it obſerved, that, for the obtaining large cabbages of the ſpring ſowing, the ſeed ought to be ſown early in March; and, if once planted out before the final planting them, it will be an advantage to the crop; the caſe is the ſame with reſpect to turnip-cabbage; but it is more eſſentially neceſſary in the common way of raiſing cabbages; for, otherwiſe, they will run into long ſhanks, and will not cabbage well; moſt gardeners allowing their plants too little room: this is not the caſe here; my cabbage and turnip-cabbage ſeeds were not ſown till the twenty-ſixth of March, and I was ſo much hurried, that I never had time to get them planted out before the final planting, ſave about three thouſand plants; and yet they are all very ſhort in their ſhanks. This may juſtly be attributed to the manner of diſpoſing them, and the culture they receive in this huſbandry.

Here I cannot omit to remark one circumſtance, for the obſervation of gentlemen and farmers who may adopt this huſbandry, viz. That I have not one cabbage this year of the ſort I intended to have; what I have being chiefly ſugar-loaf, the ſeedſman having deceived me; and, if I had not happened to have about an ounce of turnip-cabbage ſeed by me four years old, I ſhould not have had one plant of that kind this year; the ſeed, which I bought in Dublin for it, turning out a poor, ſmall, wretched cabbage.

I ſhall now proceed to make my report of the farther treatment and ſucceſs of theſe crops, before I proceed to the turnips, &c.

Upon the 17th of Auguſt, I horſe-hoed my cabbage, turnip-cabbage, and boorcole, for the firſt time, by taking off, at one furrow of the plough, only one ſide of each ridge, cloſe to the plants: thus they remained till the 25th, when I ran the plough in the ſame furrow; by which, with the firſt furrow, I plowed about twenty-one inches deep. This being finiſhed, I immediately returned the earth back to the plants; this afforded them freſh nouriſhment; and in order to give their roots time to penetrate this freſh earth, which, by the horſe-hoeing, was become very fine mould, I let them remain in this ſtate till the twelfth of September; when I horſe hoed them again, by taking off the other ſide of every ridge; and, on the twentieth, deepened the furrow in the ſame manner as

as the former, and immediately returned the mould back to the plants; and, on the eighteenth of October, threw up a ſmall furrow on each ſide of every ridge, which finiſhed the culture of theſe crops, and reſtored the ridges to the form in which they were when the plants were put out upon them.

The plants all grew very luxuriantly; and, in the hotteſt weather were infinitely more brittle in their leaves, than any I could ſee in the gardens of my acquaintance: which is a certain indication of health in this kind of plants.

The horſe-hoeing was ſo effectually deſtructive to weeds, that it coſt me but four-pence to weed theſe crops, which occupied about an acre and three quarters of ground.

The repeated horſe-hoeings coſt me two ſhillings and four-pence an acre, for workmen's wages, excluſive of horſes, of which I uſed two, and ſometimes three.

December the 8th, I cut one row of the cabbages, they beginning to decay, which is indicated by their burſting. The number was two hundred and fifty-eight, and they weighed ſixteen hundred-weight, three quarters, and twenty-one pounds, *i. e.* one thouſand eight hundred and ninety-ſeven pounds: which, at an average, is ſeven pounds and near ſix ounces for each cabbage.

The produce upon an acre, on weighing this row, which was five hundred and ſixteen feet long, amounted to twenty-tree tons, four hundred, two quarters and fourteen pounds, *i. e.* fifty-two thouſand and thirty-eight pounds: which is, at leaſt, from ten to ſeventeen tons leſs, as I compute, than the produce would have been upon an acre, had I obtained the ſort I intended to have, which was the large, late, Dutch cabbage. However, ſuch a produce as was here obtained, will be an ample reward for the labour any one may beſtow in this huſbandry, as will appear when I ſhall come preſently to ſhew how many cattle twenty-three tons will maintain.

December the 17th, I took up one row of the turnip-cabbages, which were in number two hundred and forty-nine, they weighed eighteen hundred weight, and fifteen pounds, *i. e.* two thouſand and thirty-one pounds, after chopping off the roots and ſtalks below the turnip, which ought not to be weighed, as being no part of the food for ſheep or cattle: the weight of theſe plants, one with another, was ſomething more than eight pounds and two ounces; ſome few weighed fourteen or fifteen pounds. The produce upon an acre, on weighing this row, which was four hundred and ninety-eight feet long, amounted, at the ſame proportion, to twenty-five tons, fifteen hundred, three quarters and ſeven pounds, *i. e.* fifty-ſeven thouſand ſeven hundred and ſixty-one pounds.

This crop was much greater than ever I had before; and, from ſome obſervations I have made this year, I am inclined to believe, their culture may be improved to a produce of ten tons more upon an acre: but, abſtracted from that, the produce already obtained is more valuable than any crop I know of, for they are invincible by the winter, either in or out of the ground. The great diſtreſs of even the careful farmer is in the months of March and April, for his ewes and lambs, when turnips are gone, or are but very indifferent food, and all other green winter-food is exhauſted.

Feeding ewes upon dry hay affords but little milk to their lambs; add to that, hay is not made without great expence and anxiety, over and above the rent of the land; for really, where the farmer is ſo unfortunate as to have his hay upon hand in wet whether, it is a buſineſs which will exerciſe his patience, no leſs than it will conſume his money.

One ſuperior excellence in theſe plants is, that ſheep will prefer them to turnips: another is, that they are a firmer and more ſubſtantial food: and, to aſcertain their firmneſs in texture, and quality in keeping after being drawn, I have kept them near twelve months expoſed to the open air, to the extremes of heat and cold, and, after that, they were ſound, ſave ſome few.

If any perſon who may cultivate this plant for ſheep, ſhould keep a large ſtock, he may let the plants remain in the ground till he wants them; in that caſe he may turn the ſheep into the field, where they will eat them quite down to the ſtems; and, as the plants ſtand naturally above the ground, and by my manner of cultivating them, they are ſtill higher, by being placed on the tops of the ridges, the ſheep cannot dirty them, as they do turnips when turned into the crops; add to this, that when the ſheep have eaten all the leaves, and begin to eat the butts or turnips of this plant, they will not rot as turnips do, when wounded; but will certainly keep ſound, even after that, for ſix weeks or two months: nay, yeſterday, the fifteenth of February, upon dreſſing ſome of them for ſeed, I found ſome, which had been accidentally wounded by cows, upwards of three months ago, perfectly ſound, notwithſtanding the great quantity of rain which had fallen upon them.

When the leaves are wanted early in the winter for ſheep, or black cattle, or, the land is wanting for any other crop; in either caſe the plants may be taken up, the leaves taken off, and the turnips thrown any where upon a piece of ſound dry graſs ground, where they will keep, and be ready for ſheep in the ſpring: but this work is attended with ſome trouble and expence, the roots being very firm in the ground.

The latter end of December, and in January, the plants began to throw out freſh ſhoots, which are to produce the ſeed; and, when they began to do ſo, all the leaves of the preceding year fall off, being firſt greatly decayed; and as the leaves, in October and November, are really very numerous, and afford a large quantity of food for cattle, it is well worth the trouble to take them off before they begin to decay; and, when this is judiciouſly done, the trouble is very little.

The method which I would recommend is, that two men be ſent into the field, each taking one row before him, and, as he pulls off the leaves, laying them upon the ridge between the turnips; when theſe two ridges are finiſhed, or as many as may be thought neceſſary, let one horſe, or more, be brought with a pair of cleeves upon his back; let him be placed in the furrow, between the two rows; and as he paſſes along, the two men fill the cleeves, which may be moſt conveniently done, from ſuch a diſpoſition of the buſineſs, without any injury to the turnips in the rows.

Where extenſive crops of theſe plants are raiſed, it will be very uſeful to collect all the roots, whether left in the field by ſheep, or otherwiſe ſeparated, and mix them with heaps of earth, where a putrefactive fermentation will ſhortly commence, by which the earth will be ſtrongly impregnated with volatile and fixed ſalts, and will then be an excellent manure; and, indeed, all ſucculent vegetables will contribute to the ſame end, under the like treatment.

I muſt beg leave in this place juſt to mention, for the conſideration of the ſociety, and which I earneſtly recommend to be tried by mariners, another uſe, to which, I think, this plant may be converted, which is ſtill of more importance, than any which I have yet named.

We loſe more men in the beginning of a war in the navy, as I have been informed by the navy-ſurgeons, by the ſcurvy, than by the enemy, which is attributed to their ſudden change of food. From freſh proviſions and vegetables on ſhore, the men are at once brought to ſalt proviſions.

The turnip of this plant, I am inclined to believe, would keep three or four months on ſhip-board, perhaps longer; but the navy-ſurgeons have told me, that if it would keep ſix weeks, it would ſave the lives of many men. Something has been ſaid on this ſubject before, in a pamphlet intitled, Hints on Huſbandry, in a letter to the Dublin ſociety, printed by Flinn, in Caſtle-ſtreet.

I cannot diſmiſs this ſubject, without earneſtly recommending the culture of this plant to the attention of the farmer, particularly to ſuch as keep any ſtock; and, although the plant is very little known, except in the gardens of the curious, yet, whoever will cultivate it in the way I have here ſet forth, will find himſelf amply repaid for his labour; for how comfortable is it for a man's mind to be at eaſe about his ſtock, in the months of ſcarcity? Whereas I have every year obſerved, that the farmer's ſtock, particularly ewes and lambs, are turned into his meadows to live upon the ſpringing graſs, to the irrecoverable injury of the hay-harveſt; as frequently have I ſeen them upon young clover, to the maniſeſt injury of that crop.

I could enlarge greatly upon theſe injudicious practices; but in brief I ſhall only ſay, that if I ſhall live to ſee the culture of this plant generally eſtabliſhed, I ſhall have the comfortable reward of knowing that I have been uſeful to mankind; a circumſtance which will be more grateful to me, than if I had conquered a nabob, or extirpated an Indian nation.

December the eighteenth, I cut two perches in length of one of the rows of boorcole, which contained twenty-one plants; they weighed one hundred and eighteen pounds, which is very near five pounds ten ounces for each plant: but I am inclined to believe, that theſe plants will ſucceed as well, if they are planted only eighteen inches aſunder in the rows. However, at the above proportion, there would be ſeventeen tons and fourteen hundred upon an acre. But, if the produce would be the ſame, were the plants only eighteen inches aſunder, in that caſe an acre would produce, by this culture, above twenty-three tons and twelve hundred.

This plant is well worthy the farmers or graziers attention, for, as faſt as it is cut, it will again, in about a month or ſix weeks, afford another crop: I have been cutting theſe plants for my family-uſe ever ſince the middle of Auguſt laſt; I believe ſome of them have been cut three times; and they are excellent for the table. For feeding cattle and ſheep they are highly valuable, as no froſt will injure them; and, although the firſt crop amounts not to as many pounds upon any given quantity of ground as the others, yet the ſucceeding crops will, I believe, make their produce nearly, or quite, of equal weight with any other of the cabbage kind. But I muſt not omit to obſerve, that, as theſe plants afford only open leaves, and many of them very ſmall, there will be a little more trouble in collecting and carrying them to the ſheep and cattle, than there will be with the other kinds.

It may not be improper to obſerve, likewiſe, that, upon the approach of the ſpring, when they begin to throw out their ſpring-ſhoots for ſeed, if the large leaves have not been taken off for winter uſe, they will decay and fall off in the ſame manner as the turnip-cabbage leaves have already been deſcribed to do.

I have not yet tried it, but I believe that the beſt way of uſing this plant, would be to allot one whole field to the culture of it, proportioned in ſize to the ſtock intended to conſume the produce; and in September or October, to turn the ewes into the field for a few hours, morning and evening, and then lodge them on any piece of graſs or fallow, which may want improvement, to which they will greatly contribute by emptying themſelves upon it; and thus continue turning them into the boorcole field, till they have eat all the luxuriant leaves; then let the plants reſt a month, and there will be another crop. By having two ſmall fields under this crop, a flock of ſtore-ſheep might be maintained a whole winter at a very ſmall expence; for whilſt the produce of one field would be conſuming, the other would be coming on.

This method occurred to me from an accident, which attended my boorcole this year. My cows got into the field, and preſently devoured ſome of the leaves of the plants; theſe plants have engaged my attention ever ſince, and I have the pleaſure to ſee them again in a very luxuriant ſtate.

If any perſon ſhould be able to put this ſcheme in practice before I can accompliſh it, I recommend it to them, not to let the ſheep paſture ſo long upon the crop, as to wound the ſtalks for want of leaves; as too great an injury to the ſtalks may check the ſucceeding growth; which injury, I am inclined to believe, will not happen to the plants, at leaſt not in ſo great a degree, whilſt they have a ſufficient quantity of leaves.

It doubtleſs will be obſerved, that I confine this ſcheme to ewes or ſtore-ſheep: my reaſon for that is, that fat ſheep ſhould always have as much food before them, as they may chooſe to eat; add to this, that ſheep, when they are fat, are more ſubject to be lame, than ſtore-ſheep, to which ploughed ground will greatly contribute.

We ſhall now return to the ſtate of the field, in which it was after being manured, and ploughed into ſmall ridges of five feet breadth, with the compoſt under them in the fallow part, and part of the fallow with the lime and earth, and the potatoe ground aided with the lime.

Upon the fourteenth of July, I ſowed with my drill plough what remained of the ridges of the fallow manured with the compoſt. That part of the fallow which was manured with the lime and earth, and that part of the potatoe ground which was before deſcribed to be in ridges, with turnips, and that part of the fallow before deſcribed to be flat, and manured with a double proportion of the compoſt, I ſowed in the promiſcuous way with turnips alſo.

The drilled turnips filled only one row along the middle of each ridge.

When the drilled turnips were about three inches high, I thinned them by hand, as being much preferable, and more expeditious than any inſtrument, intending to have them ſingled out to about one foot aſunder in the rows: but, it being ſo new a work, the women could not be brought to do it effectually at once, they apprehending, that the whole crop would be loſt, and urging, that they were

were ſure there was already too much ground allowed to one row: under theſe circumſtances, I could not get this work done quite to my mind this year, as I had, beſides this field, two others ſown in the ſame way, amounting in all to about twelve acres.

My turnips ſhould have been ſown at leaſt three weeks earlier; but the immoderate and continual rains of the preceding winter, involved me ſo much with my ſpring-ſowing, that I could not accompliſh my turnip-ſowing earlier.

The turnips, after being thinned, received the horſe-hoeings much about the ſame time, and diſtances, as the cabbages; with this difference only, that I deepened the furrows of but a few ridges in another field by a ſecond ploughing in the ſame furrow, which I did not find to benefit the turnips much: for, if the ground be well prepared before the ſowing, the depth of one furrow will be enough for turnips, provided that be deep and bold.

Thinning the turnips in drills by hand coſt me eight-pence an acre; weeding of them coſt me four-pence; and the repeated horſe-hoeings about fourteen-pence an acre for workmen's wages, excluſive of the horſes, of which I generally uſed two, except in very hot days, and then I found three were neceſſary.

The broad-caſt turnips were carefully thinned by hand, when they were about two inches high; which the women did with more courage than they did the drills; and ſometime afterwards, I hand-hoed them once, and weeded them twice.

Thinning them by hand coſt me four ſhillings. Hoeing them afterwards coſt eight ſhillings, and weeding them coſt me two ſhillings and four-pence. They were ſcarcely half an acre; this expence being therefore doubled, they coſt me at the rate of twenty-eight ſhillings and eight-pence an acre, over and above the extraordinary ploughing, and double proportion of manure.

In truth, this crop greatly exceeded my expectations, being by far the beſt I ever had in the broad-caſt way; but I attribute their ſucceſs wholly to the thinning them by hand; for two, three, four, and often more, turnips will be ſo united and interwoven, that it would be impoſſible for the moſt dexterous hoer to ſeparate them; whereas the fingers and thumb will preſerve the maſter plant, whilſt the others are moſt conveniently drawn from it by the other hand of the perſon employed: add to this, that there is no labour in which we are more liable to be deceived, than turnip-hoeing.

In one of my other turnip fields I manured about an acre of ground with ſhell marle, which I ſowed in drills with turnips in the ſame manner as the former, on the ſixteenth of July.

In the ſame field, I manured about half an acre with the native earth, which had been expoſed to the weather for upwards of two years, which I ſowed likewiſe in drills with turnips on the ſixteenth of July.

Both theſe crops were thinned by hand, and horſe-hoed, in the ſame manner as the former.

Thus we have five experiments in the drill way upon turnips, with different manure. One with the compoſt already deſcribed, one with lime, one on potatoe ground, aided with lime, one with ſhell-marle, and one with native earth; and alſo one in the broad-caſt way, with a double proportion of the compoſt, and an extraordinary ploughing.

The principal point to be determined by theſe experiments is, whether ſowing turnips in drills, or the broad-caſt way, will afford the heavieſt crop: but the trials with the different manures will, I hope, be alſo uſeful.

The produce of drilled and broad caſt turnips compared.

December the ſeventeenth, I meaſured out three ſquare perches of the beſt of the broad-caſt turnips, and alſo three ſquare perches of the drilled; and the produce was as follows:

The three perches of the broad-caſt turnips weighed ſixteen hundred weight and one quarter, *i. e.* one thouſand eight hundred and twenty pounds; which, at the ſame proportion, amounts upon an acre to forty-three tons, five hundred weight, three quarters and ſix pounds. *i. e.* ninety-ſix thouſand nine hundred and ſeventy pounds.

The three perches of drilled turnips weighed ſeventeen hundred weight, two quarters, and twenty-one pounds, *i. e.* one thouſand nine hundred and eighty-one pounds; which, at the ſame proportion, amounts upon an acre to forty-ſeven tons, two hundred, three quarters, and two pounds, *i. e.* one hundred and five thouſand five hundred and ninety pounds.

	T.	C.	Q.	lb.		Pounds
An acre of drilled turnips	47	2	3	2	or	105520
An acre of broad-caſt ditto	43	5	3	6	or	96970
In favour of the drilled	3	16	3	14		8620

Thus we ſee, that, notwithſtanding the extraordinary proportion of manure, and the extraordinary ploughing, which was afforded to the broad-caſt turnips, the drilled crop, with intervals of five feet, produced the greateſt quantity upon an acre, by three tons, ſixteen hundred, three quarters and fourteen pounds weight.

The drilled turnips in my other fields were very large, regular, and even crops, as many gentlemen ſaw during their growth.

Thoſe ſown on the acre manured with the ſhell-marle were very near as good as the reſt—thoſe ſown on the potatoe ground were not near ſo large, but were regular—thoſe ſown in that part of the fallow-ground which was limed, were very poor crops—and thoſe ſown on the ground manured with the native earth were miſerable.

The crops in my other fields were all treated in the ſame manner as that already deſcribed; except, that the fallows were broke in September, 1763, inſtead of March, 1763.

It now remains to deſcribe the nature and quality of the land, and then to draw concluſions from the various experiments.

The land lies upon a lime-ſtone quarry, which is very near the ſurface; and is, naturally, a very ſtrong and ſtubborn ſoil, with an infinite number of looſe lime-ſtones in it. With dry winds, or a parching ſun, the ground unites, and is as hard as bricks; moderately wet, it is reducible by inſtruments; but, when thorough wet, it runs together, and is like brick-clay when tempered. This, I repeat it, is the natural quality of the land, and is what the writers would call a barren, grey, ſtiff earth, but is not quite a clay.

I have found repeated tillage, when the land is in a proper ſtate of moiſture, will reduce it, and diveſt it of its

natural adheſion. Tillage and manure together render it capable of producing any thing; as, I believe, ſuch agents will do upon any land, provided it can be kept moderately dry. The fields, which I had under turnips and cabbages, have been in appearance all the ſummer a fine loam, and really bore the complexion of very fine land, abſtracted from the rich appearance of the crops.

I recommend to the practice of all perſons, who may have ſuch land as this to work upon, never to harrow the fallows before winter, but as early as may be in the ſpring, and during the working the fallow in the ſummer, but not to leave more than one day's ploughing unharrowed, but rather harrow in the evening what has been ploughed in the morning, and then the harrow will reduce it; but if the ploughing is continued for two days, without any harrowing, the harrow will have no more effect upon the land, than it would have upon bricks, unleſs it be moiſtened with rain; in which caſe it will be reducible, as, it may be remembered, I deſcribed the potatoe ground to have been reduced, after rain which fell on the twelfth of May.

Concluſions to be drawn from the preceding Experiments.

Theſe experiments prove gardens to be no more than farms in miniature, under an extravagant expence of culture; ſince we can with the plough raiſe more tons of the larger kinds of garden vegetables for twenty ſhillings, than by the ſpade for as many pounds: and, indeed, I do not ſee why moſt of the ſmall ones may not be raiſed in the ſame way.

They alſo prove, that it is profitable for the farmer to raiſe different ſpecies of cabbage for his cattle in winter; and I have it in contemplation to try them for ſummer uſe alſo. However, for the winter, it is an object of great importance, not only to the well feeding of cattle, but to the ſaving an infinite conſumption of hay, which by this huſbandry may, at leaſt, be paſtured in ſummer.

The experiments on the turnips prove, firſt, that it is more profitable to raiſe them in drills, than in broad-caſt: ſecondly, that the culture is a great deal cheaper: thirdly, that leſs manure will produce a larger crop, than in broad-caſt, provided it be diſpoſed the ſame way as mine was; fourthly, practice ſhews the expence of drawing the drilled turnips for ſheep or black cattle, to be at leaſt two-thirds leſs, than drawing the broad-caſt: fifthly, in the drill way not a turnip need be left upon the ground; whereas, in the broad caſt way, the leaving many is unavoidable, to the great annoyance of the ſucceeding crop, particularly if that ſhall be barley: and ſixthly, that the land is left after drilled turnips, in a much higher ſtate of preparation for a ſucceeding crop, than it can poſſibly be in the broad-caſt way. To theſe advantages another may be added, which I find very material, viz. that of ſlicing them for black cattle, which is highly neceſſary, even when they are ſmall, nay more ſo, for cattle are ſometimes choaked with a ſmall turnip. A man will be near as long ſlicing a ſmall turnip as a large one, and will make no diſpatch; whereas, my men and boys now ſlice for me every evening about nine hundred weight in an hour; which is a taſk upon them after night-fall, except on Saturday nights; then they ſlice double the quantity.

As it ſeems to be a paradox to ſay a man will ſlice a large turnip as ſoon as a ſmall one, it may be proper to explain it to the reader. The man is in danger of cutting his hand when he is ſlicing a ſmall turnip; but in no ſuch danger with a large one: and, beſides that, one ſlice of a large one, contains more food, than two or three whole ſmall ones.

The experiments prove, that the potatoe tillage, in the manner it is now generally practiſed, is not ſo beneficial an improvement of land, at leaſt not of ſtrong ground, as is generally imagined: although there is a greater conſumption of dung than in any other huſbandry.

The experiment with the lime upon the fallow ground, proves lime to be an inſufficient manure, for the high improvement of lime-ſtone ground. There are ſo many advocates for lime as a manure, that it is adventurous to ſay any thing againſt it; but, I hope, the reader will obſerve, that I pronounce upon it, as being inſufficient, "for the high improvement of lime-ſtone ground." I have tried lime in another field of my farm, in which I ſowed wheat, and my ſucceſs was no better in that than in my turnips; and I earneſtly recommend it to every improver, who may have favourable opportunities of getting lime, that he try it upon a ſmall patch, before he launches into a large expence for it; ſuch caution may perhaps ſave him money. This advice ariſes from practice; for I imprudently burnt a large quantity of lime, at an expence of near an hundred pounds, and, I can truly ſay, I have not received in benefit as many ſhillings.

The experiment with the ſhell marle, proves that to be a very high and excellent manure; for, as it will produce turnips upon poor ground, it may be ſafely relied upon for any other crop.

The native earth proves to be perfectly inſufficient for turnips; though it certainly mends the ground a little, beſides that it adds to a ſhallow ſoil.

Accidents and Diſtempers.

Turnips are ſubject to be deſtroyed by the fly. In an orchard I ſowed two acres with turnip ſeed in drills in July laſt. They were invaded by the fly; I had a conteſt with them for a fortnight, and at laſt conquered them, with a loſs of only four or five perches of my turnips, which happened where there were moſt trees. Every morning before the dew was off, I had the rows daſhed with lime, which was ſlaked every day on purpoſe. This lime adhered ſo cloſely to the leaves, when they were wet with the dew, that it defended the upper ſides from injury: then I found the flies began on the under ſide of the leaves, which I had never ſeen them do before; however, upon this, I was obliged to have the duſt thrown very low; and, whilſt the plants were wet, a great deal adhered to them, even on the under ſides:—thus I ſaved my turnips, which were as fine a crop as any I had, ſave the four or five perches before-mentioned.

The upper ſide of the turnip leaf, in its infant ſtate, is very ſmooth, and on that part the flies always lodge, unleſs they are interrupted; in that caſe they will deſtroy the plants by wounding the under ſide, which is not ſo inviting to the inſect as the upper, it being a little rough, though not enough to protect it from them.

The greateſt inconvenience I found in this work was, that every little ſhower of rain waſhed off all the lime, and then the work was to begin again; ſometimes I repeated it three times a day: however, it will be found to anſwer well, but it requires to be done with care.

I have

I have, by the ſame method, ſaved lucern, which is alſo ſubject to be deſtroyed by the fly, upon its firſt coming up.

I diſcovered laſt ſeaſon three diſtinct ſpecies of the turnip fly (if I may ſo call it) one of them is black; it ſeems to hop like a flea, and reſembles it exactly. The ſecond is a ſmall degree larger, and very diſtinguiſhably has wings, upon which are two ſmall white ſpecks; and the inſect is of an oval form. The third is like a domeſtick fly, but not by a fourth part ſo large.

The turnip-cabbage is ſubject to the ruſt, or mildew. In my orchard I had ſome plants put out, at different diſtances, for experiments; they grew very well for a time, but they were all infected with the ruſt, and thoſe neareſt the trees ſuffered moſt. In my field I could find but three, which were injured by this diſtempter. This ſeems to prove that they require an open expoſure; and therefore they better ſuit the purpoſe for which I have recommended them.

Turnips, cabbages, turnip-cabbages, and boorcole, are food for black cattle and ſheep.

A ſheep, I find, will conſume about twenty pounds of turnips in twenty-four hours, provided they are allowed as many as they can eat, which ſhould always be allowed to fat ſheep; but as ſheep vary in ſize, ſo I preſume will they conſume more or leſs food.

An acre of turnips, of forty-ſeven tons to an acre, will maintain one hundred ſheep fifty-two days, allowing each ſheep twenty pounds a day. My ſheep weigh about twenty pounds a quarter.

In the month of November laſt, I gave my ſheep acceſs to ſome pea-ricks, which I had erected on purpoſe for them, of which they eat with great eagerneſs; but I find they affect them in the ſame manner as they do horſes, when given to them new; for the ſheep, I apprehend, from violent cholicks, which I conceive the peas gave them, were ſeized with ſtrong convulſions; and in this way I loſt ſix of them, in a few days, before I conſidered what could be the cauſe: but having examined the inteſtines of every one of them, and finding no ſymptoms of any other diſeaſe, I was led to draw the following concluſion; and what ſeems to confirm my opinion is, that I have not loſt one ſince I took them from the peas. If other perſons have not met with the like accident, who have fed their ſheep with new peas, it ſhould ſeem that turnips and peas together do not agree with ſheep. However, that is a fact which I ſhall ſoon be able to determine, for I ſhall admit the ſheep to the peas again to-morrow, which will be the twentieth of February; a ſeaſon in which it is imagined we may ſafely give peas of the preceding year to horſes, and therefore, I conceive there can be no danger in giving them to the ſheep: but, if they ſhould be affected as they were before, I think there cannot remain a doubt, that the peas and turnips diſagree in their ſtomachs. And here I ſhall leave a ſpace to add to my report afterwards.

Now, the fifteenth of March, the ſheep have been ever ſince at the peas, and I have not loſt one.

Of cabbage, and turnip-cabbage, a ſheep, of about twenty pounds a quarter, will conſume about fifteen pounds a day. An acre, at that rate, will maintain one hundred ſheep about thirty-four days. The cabbage, and turnip-cabbage, are a firmer and more ſubſtantial food than turnips.

I have fed a cow this winter upon turnips, and I have now two bullocks which are ſtall-feeding upon turnips alſo. It is computed that they weigh between four and five hundred weight each; and I find by experiment, that they each of them eat about two hundred and ſixteen pounds in twenty-four hours; which is, therefore, about half their own beef-weight; from hence we may, with reaſon, imagine a beaſt will eat every day of turnips, at ſtall-feeding, about fifty-ſix pounds for every hundred weight of beef he may contain.

One of the bullocks was put up miſerably poor from the plough, for an experiment, on the fourteenth of December; he took kindly to the turnips; and on the ſixteenth I began to give him, with his turnips, pea-flower, to the amount of eight pounds every day; and I find he is greatly improved, but he will not be beef; though I am very inclinable to think, that if he had been put up ſix weeks ſooner, in April, he would have been good beef. This experiment I ſhall repeat next year. What induced me to mention it here is, that ſome other perſons may perhaps try it next winter, and, if they ſhould, I ſhall be much obliged by their report of the effect. I am led to believe, that bullocks may be profitably fed with peas, becauſe horſes, and pigs, thrive very faſt upon them.

When the cattle are firſt put to turnips they dung but little, the turnips going off chiefly by urine, the quantity of which is really incredible; but, after ſome time, they dung more; and, from a whitiſh colour, the dung reſumes the natural colour, and is of the common firmneſs. I allow each of the cattle ſeven pounds of hay every day, and I do not find that they eat fewer turnips on that account; the reaſon, I believe, is, that the hay makes them more eager for the turnips. They refuſe water.

To each of my cows, and ſtore cattle, I allow ſeventy-two pounds of turnips a day, and a little ſtraw, thirty-ſix pounds being what I find a moderate-ſized beaſt will eat at a meal. To my plough bullocks I allow the ſame quantity of turnips, with as much ſtraw as they can eat; but I forbid them having the turnips till they have been unyoked about an hour, and after they have eat ſome ſtraw; as I conceive the turnips are too cold for them immediately after their labour.

I have lately confined a milch cow four days, and fed her with turnips, and I could find no diſagreeable flavour in her milk from that food, though I have often heard turnips complained of as giving a bad taſte to the milk, when cows are fed with them. Query, whether it might not ariſe from the leaves of trees falling upon the turnips? Leaves of trees always ſpoil the milk when cows eat them.—Here follow

Calculations upon the feeding Black Cattle with Turnips and Cabbages.

Suppoſe four cows or bullocks, of four hundred weight each to be ſtall-fed upon turnips, allowing each beaſt two hundred and ſixteen pounds a day, an acre of forty-ſeven tons would maintain them one hundred and twenty-one days. Indeed a larger ſtock ſhould be put up, for heavier cattle, as the turnips will not keep ſo long.

Suppoſe ten dairy cows to be maintained upon turnips, allowing each cow ſeventy two pounds of turnips a day at this rate, an acre of forty-ſeven tons will keep them one hundred and forty-ſeven days. All cattle, fed in this

manner, ſhould have about ſeven pounds of hay a day allowed to each.

The fat cattle eat about one hundred and a half of cabbages a day; therefore an acre of twenty three-tons will, at that rate, maintain four bullocks, of four hundred weight each, ſeventy-ſix days.

When fed with cabbages, they dung more, and make leſs urine, than when they are fed with turnips, and will drink a little water.

Hence I am induced to believe, that cabbages are a better food for cattle than turnips. I am fully perſuaded near as many tons may be raiſed upon an acre, with proper feed and good management; but they will coſt five or ſix ſhillings an acre more.

There remains one general obſervation to be made, and which I imagine contributed greatly to the ſucceſs of the abovementioned crops, viz. that we had for theſe ſpecies of crops, very ſeaſonable and fine rains. From the ſixth of July, on which day I began to put down my cabbage-plants, to the firſt of December, both incluſive, we had ſeventy days, in which there was, more or leſs, rain; and the latter end of Auguſt, and beginning of September, the heavieſt dews that I have ſeen. From the ſixth of July to December the firſt, both incluſive, were one hundred and ſeventy-ſeven days; ſo that we had but one hundred and ſeven dry days, many of which, I ſee by my kalendar, were cloudy and inclinable to rain.

"Land, ſays an Eſſex farmer, cannot be brought into too good tilth for ſowing turnips: they require a deep, looſe, well-wrought mould; and to effect this, diſcreet plowing and harrowing is the beſt way. I ſay diſcreet, becauſe one plowing, properly timed, is worth three that are out of time. It is a maxim in huſbandry, that ſome land cannot be ploughed too much; but we ſhould add, at proper ſeaſons and intervals, or an ignorant farmer might ruin himſelf, and yet think he had followed the directions that were given him.

"A light land requires leſs ploughing, as well as leſs nicety in the times of ploughing, than a ſtiff heavy ſoil; and it is alſo ſooner brought into good tilth: two well-timed ploughings will often do it; whereas a clayey ſoil will require three or four, before it is brought into order.

"An early ploughing will greatly forward the getting a ſtiff ſoil into order: the month of April ſhould be the lateſt that ſuch, when intended for turnips, ſhould be turned up. It may then lie till the beginning of June, when it ſhould be harrowed down with loaded harrows to break the clods, and immediately croſs-ploughed: about a fortnight after this it ſhould be ploughed for the laſt time, and immediately croſs-harrowed and ſown out of hand with turnip-ſeed pretty thick, and ſcratched with a light harrow to cover the ſeed.

"Light lands, as I ſaid before, may do very well with two ploughings, one in the ſpring, and the other juſt before ſowing at Midſummer.

"I look upon it that turnip-ſeed cannot well be ſown too thick, for it ſeldom all comes up, and of what does get above ground, much is often deſtroyed by the fly, and ſlug; ſo that the plants ſometimes, though the ſeed was ſowed thick, require but little thinning by the hoe. In fact, I think it better at firſt to beſtow an additional quantity of ſeed, than to have to ſow three or four times over, as I have been often obliged to do, till I practiſed this method of ſowing thick, which generally ſucceeds very well with me.

"The beginning of July is the time in which I, for the moſt part ſow my turnip-ſeed; in this matter the grand affair is to hit it off, ſo that the turnips do not grow ſticky or ſpongy before the winter, and yet are forward enough in their growth to reſiſt the froſts, &c. and be fit food for the cattle in the winter, or in the ſpring.

"To have a good and profitable crop of turnips, it is abſolutely neceſſary they ſhould, at proper times, be hoed, not only to kill the weeds, but alſo to thin the plants, and ſet them out at a proper diſtance.

"The proper time for the firſt hoeing, is when they have put forth their fourth leaf, and the ſecond hoeing ſhould be in about three weeks afterwards: twice is, in general, enough, unleſs a very following rainy ſeaſon ſhould come on, when it will be proper to take the advantage of the firſt ſun-ſhine weather, to give them a third hoeing; this, indeed, is often neglected, but I always found it pay well, by the thriving condition it put my crop in.

"As to the diſtance at which the plants ſhould ſtand one from the other, that muſt be regulated by the ſize of the turnip; but it ſhould never be leſs than one foot, nor is there occaſion for its being more than two: about ſixteen or eighteen inches is a proper diſtance for the common turnip we generally ſow about us.

"If the ſoil on which the turnips grow, is light and dry, the moſt profitable way is to feed your ſheep on them in the ſpot where they grew; but if the ſoil is heavy and ſtiff, it is beſt to have them pulled,, and carried in tumbrils on to ſome dry paſture, or on any dry field you want to mend; for was you to feed them on the land, one half of them, at leaſt, would be rolled in the dirt, trodden under foot and ſpoiled.

Land cannot be too rich, or to well dunged, for bearing turnips; and this will bring them forward, and make them eſcape the fly better; for when once the leaves become rough, the fly does not choſe to touch them: it is therefore certainly beſt to encourage them in their growth, and bring them as ſoon as poſſible out of danger.

"When my young crop of turnips have come up, and I have been fearful of the fly, I have frequently ſown over them wood aſhes, and ſometimes ſoot: theſe have been of great ſervice, eſpecially if gentle rains followed, as neither the flies nor ſlugs choſe afterwards to touch them. But I muſt obſerve, that this is no ſafe remedy, if the weather is dry and hot, for aſhes being of a hot nature, will then be apt to burn up the crop.

"As to the ſlugs, the beſt way of deſtroying them in dry weather is with a light roller: this cruſhes and kills them, and does the crop ſervice, eſpecially if it is light land; for it preſſes the particles cloſer, ſo that the moiſture in the earth is not ſo ſoon exhaled by the heat of the ſun; conſequently the young turnips do not ſo ſoon ſuffer by a continued drought.

"It is ſcarcely neceſſary to obſerve, that dry weather is beſt for hoeing turnips in, as then neither the weeds nor the turnips that are cut up are apt to grow again.

"In light gravelly or ſandy ſoils, the ſeeds of turnips may be deeper covered than in ſtiff clayey land: in the firſt it may be pretty well harrowed in; in the latter, it ſhould only be ſlightly ſcratched with a very light ſhorttined harrow, or even only buſh-harrowed; as by that means they will ſooner appear above-ground, be ſooner out of danger, and thrive better afterwards, the apple of the

the root growing almoſt entirely out of the ground, the whole nouriſhment being collected by the tap-root, and by the horizontal roots, which iſſue from it on all ſides.

"The quantity of ſeed to be ſown on an acre, ſhould be from two to three pounds, according to its goodneſs; and many uſe equal quantities of old and new ſeed, thinking this method beſt; for the new ſeed comes up firſt, and if the fly takes it, the old ſeed in a day or two ſucceeds, and generally fares better.

"If a crop of turnips fails, either through any defect in the ſeed, or by the ravages of the fly or ſlug, it is uſual for the farmer to ſow the ſame land again; and this, if there is occaſion he repeats two or three times, till at laſt he ſecures himſelf a crop. For the reaſon above-mentioned it is eſteemed beſt to ſow early, as by that means there will be time, if the firſt crop fails, to ſow another.

"Turnip-ſeed is very apt to take damage from wet, if it is not covered as ſoon as ſown: without this precaution it will ſprout prematurely, malt, or mould: by too early a germination the ſeed is apt to burſt.

"When peas are ſown on a rich mellow earth, they are apt to grow rank: in this manner they cover the ground, keep the moiſture in it, raiſe a kind of fermentation in the ſoil, and make it hollow and porous; inſomuch that when the crop has been off, turnips have been harrowed in without ploughing, and have thriven amain: but there is danger in purſuing this practice without great caution." *Muſeum Ruſticum, vol.* I. *page* 205.

"I have in my time, ſays a Norfolk farmer, ſown a great deal of land in turnips, and have applied them with great advantage to various uſes; but our chief reaſon for cultivating them in this county is for feeding and fattening ſheep.

"It is almoſt needleſs to ſay, that they anſwer this purpoſe extremely well, their uſe is too well known to all the eaſtern farmers, to be in theſe days controverted.

"We have various methods of ſpending them: ſome fold their ſheep on the land where the turnips grew; I have done this, but it is not a method I approve of: however, for the benefit of ſuch farmers as choſe to practiſe it, I ſhall give one caution; which is, that they uſe wicker hurdles for folding their ſheep, which will otherwiſe be apt to thruſt their heads through the bars, and, entangling themſelves, are by that means often killed in the night, to the great loſs of the owner.

"If, however, it ſhould not be convenient to the farmer to get theſe wicker hurdles, but he ſhould be obliged to take up with thoſe made of reſt ſtuff in form of a gate, let him then be careful, when he has ſet his hurdles, and ſtaked and bound them right, to pull up all the turnips that grow within two or three feet of the outſide of the fold, and throw them over the hurdles for the ſheep to eat within-ſide.

"This will take away any temptation the ſheep may have to put their heads through the bars, and they will by that means eſcape the danger of being ſtrangled.

"Every animal is fond of liberty; and though the ſheep will bear confinement, perhaps, better than any other creature, yet whoever has ſeen them when firſt driven into the fold, muſt have obſerved that they naturally go round the hurdles to try to find an opening to get out at; by this means the turnips which grow near the hurdles are trampled on, dirtied, and ſpoiled. For this there is a very eaſy remedy; let the ſhepherd only pull up all the turnips that grow near the inſide of the hurdles, and all will be well.

"I obſerved before, that I am not fond of giving my ſheep turnips as they grow: I think it much the better way to have them pulled; by this means they have an opportunity of eating the whole root, and my ſtock of winter fodder goes much further; whereas, when they feed on the turnips as they grow, they generally ſcoop them out, and leave a hollow ſhell in the ground, which, though it may afterwards be forked up, the ſheep will ſcarcely even by hunger be induced to touch, as it cannot but be ſoaked by the dung, urine, and dirt from the feet of the ſheep.

"I find it then the beſt way, to have my turnips pulled before they are given to my ſheep; they go much farther, and do them more good.

"But in this method there is one ſeeming inconvenience, which is that in froſty weather when the ground is hard, I cannot have them pulled; yet this difficulty is very eaſily removed, by laying up, at the beginning of the winter, a ſufficient ſtore of turnips, ſecured from the wet, and not much expoſed to froſt.

"I think it worth while to have a building particularly dedicated to this uſe, and find it anſwer well: it is built in form of a ſmall barn, and boarded round.

"In the beginning of the winter, before the froſt ſets in, I have a large quantity of turnips pulled, and the dirt is carefully ſcraped off them; and, after cutting off the heads and tap-roots, I cauſe them to be regularly laid in my ſtore, with this caution, however, that all round the ſides next the boarding, my men lay ſtraw to keep out the froſt. The heads, or tops, I give to all my cattle in general, as they are cut off; by which means I, in fact, ſuffer no loſs.

"I find theſe ſtored turnips a happy reſource when hard weather comes on; then I open my repoſitory, and deal them out to my ſheep in ſuch a manner that there may be no waſte; and as ſoon as the weather breaks, and the earth becomes leſs hard, I reſort again to the fields, and have them pulled as uſual.

"For ſome years I had another manner of ſtoring my turnips, which was by digging a deep pit in a ſandy, dry field, which being filled with turnips, they kept there very well; yet, as this method was ſubject to many inconveniences, I left it off.

"I have diſcovered another uſe for the turnip, beſides feeding my ſheep, oxen, and cows with it, which I muſt mention before I conclude this letter. I find it agrees remarkably well with hogs, which will eat of it greedily, and thrive on it a pace.

"I have ſeveral times tried this, and have often killed fine young porkers that had for many weeks eat nothing but turnips boiled in ſwill, or waſh, till they were tender.

"I have at other times given turnips to large hogs, that have been put up to fatten, in order to their being killed and ſalted for family uſe; and here I was not diſappointed in my hopes; they always came on well: but I made it a cuſtom to give them, for a week or two before they were killed, a few buſhels of boiled peas, in order to harden their fat, that it might not boil away in the pot.

"I gave them boiled peaſe rather than raw, becauſe, having been long uſed to eating the ſoft turnip, I found they did not afterwards take kindly to the hard, raw pea.

"Hogs may eaſily be brought to eat raw, unboiled turnips; but it is much better to boil them when the hogs

are

are to be fattened; for though they will eat enough of them raw to keep them in tolerable good plight, yet they will not eat enough to fatten them apace." *Muſeum Ruſticum, vol.* I. *page* 335.

"I had laſt winter, ſays an ingenious clergyman of Northampton, a piece of turnips intended for feeding ſheep; but my method of conſuming them at firſt aſtoniſhed my neighbours.

"I fed them off by the fold; but I firſt turned in ſome ewes, which greedily devoured all the tops and leaves: when they had finiſhed them, I immediately folded my ewes on a freſh ſpot.

"After the leaves were eat off the firſt ſpot encloſed by the hurdles, by the ewes, I turned in ſome weathers, which eat with a very good appetite the apples of the roots, leaving, however, the lower part ſcooped out in the ground: theſe I had forked up, and they were eat by my ſtore-ſheep.

"My neighbours were convinced my method was right, becauſe I evidently kept and fattened more ſheep on the ſame quantity of land, than they did; yet they begged I would give them my reaſons for this my practice.

"I told them I would readily comply with their requeſt, and the more ſo as it might be a means of tempting them to imitate what they ſaw practiſed with ſucceſs.

"Continuing my diſcourſe, I informed them that many years experience, and conſtant obſervation, had convinced me, that if you turn a parcel of ſheep promiſcuouſly into a field of turnips, the ewes and lambs would immediately attack the leaves; the fattening weathers would, for the moſt part, prefer the apple of the root; and the ſtore-ſheep, not being nice, would indiſcriminately devour both leaf and apple, and even eat the leavings of either of the others.

"I farther informed them, that I had frequently obſerved that when a parcel of weathers have been turned into a piece of turnips, the farmer, thinking to have no waſte, generally kept them in till they have eat the roots up. But this is very bad huſbandry; for after the weathers have eat the moſt delicious and ſweet part of the root, they loathe the reſt, which is generally gritty, dirty, and ſodden, inſomuch that nothing, but abſolute hunger, will tempt them to taſte it. In this period they pine and looſe fleſh; and by the time they are turned into a freſh bite of turnips, they are but little better than they were at firſt.

"The appetite of a beaſt that is fattening ſhould be tempted, not palled; and undoubtedly, ſuch of the ſheep as are moſt forward will be moſt delicate; and this delicacy, if the farmer is wiſe, he will indulge, as it will eventually turn out to his advantage.

"Thus, in my manner of feeding turnips, the ewes come firſt, becauſe they prefer the leaves; the weathers that are to be fattened follow, and make the moſt pure and ſweet repaſt; and the ſtore-ſheep, which are the leaſt nice of any, come laſt, and clear off the remains; at leaſt, as much of them as they ought to be permitted to eat; for I do not hold it good to oblige them to eat what are in a half putrefied condition, and ſodden with dung and ſtale.

"My neighbours were ſo well pleaſed with my reaſons, and ſo well convinced by what they ſaw, that they are determined to adopt my practice; and if any of your readers ſhould be of the ſame mind, it would give me great pleaſure, as I cannot feel a truer joy than what reſults from my endeavours to be of ſervice to my fellow creatures." *Muſeum Ruſticum, vol.* II. *page* 231.

"I laſt year ſowed ſome turnips, ſays a farmer near Chelmsford, on near ten acres of good light land. Some other buſineſs interfering, prevented my getting them hoed in due time, inſomuch that, by the latter end of Auguſt, they ſeemed to be almoſt covered with weeds.

"Being willing to endeavour at recovering my crop, I cauſed the field to be harrowed and croſs-harrowed, which ſet them out pretty well, and cleared away a great number of the weeds, inſomuch that the turnips got a-head, and grew to be a tolerable crop.

"I ſend you this for the information of ſome farmers, who, when they have delayed hoeing their turnips for a few weeks, if the weeds get forward, think they have loſt their crop; whereas, would they adopt this method, which has been more than once recommended, they would find it anſwer any reaſonable expectation they could form. I have ſeveral times tried it, and it always ſucceeded with me more or leſs. The work coſts but little, and the benefit reſulting from it is conſiderable. I have known farmers plough up a crop of turnips which, by harrowing, would have yielded them a good return." *Muſeum Ruſticum, vol.* V. *page* 239.

"I have known many, ſays farmer White of Suffolk, who intend feeding off their turnips with ſheep, keep the turnips till they are too old to be applied with advantage to that uſe. Your readers may give me credit, for I ſpeak from experience; and I can aſſure them, that one acre of young turnips is of more value for fattening ſheep than two acres of old ones, as the weathers you turn in will get fleſh and fat at leaſt as faſt again on the firſt as the laſt.

"Let this maxim be treaſured up in the farmer's memory; and let him not at any rate be tempted, for the ſake of ſpending a few weeds and graſs on his fallows, to keep his turnips till they are of little worth.

"If any of your readers ſhould be incredulous, let them try the experiment; it will be but little expence, and ſtill leſs trouble. I did ſo myſelf before I adopted the practice, and was in a very ſhort time convinced: this happened ſome years ago, and I have continued this method ever ſince." *Muſeum Ruſticum, vol.* II. *page* 279.

We ſhall conclude this article with the following letter we were favoured with from Mr. Mathew Cox of Wallhampton, near Limington, in Hampſhire:

"I have, ſays he, incloſed you a draught of a hoe-plough, which I have found to anſwer very well for hoeing carrots and turnips, which may probably be improved by ſome of your ſociety: the following is the particulars of its ſucceſs this year 1766. I took poſſeſſion of the farm I live on in April, and going ſoon after to London, ordered my ſervant to ſow two acres of carrots with four pounds of ſeed; on my return, I found he had ſown all the ſeed I had left him, being twenty-eight pounds. In May the carrots came up as thick as ſand on the ſhore. The people here being intirely unacquainted with the method of hoeing, made my work very tedious, as I was obliged conſtantly to attend them. It coſt me ſixteen and ſix-pence per acre, and the work not half done; I then harrowed them, &c. according to Mr. Billing's directions, and in June found ten times too many to come to any ſize; but could not get the ſecond hoeing performed under one guinea per acre: I then gave directions for this hoe, which I fixed to the common horſe-hoe plough, and hoed

hoed my two acres in five hours with eaſe; next day I harrowed them with common harrows. About ten days after I harrowed them again, and have kept nine horſes on them ever ſince Auguſt, except a quarter of oats in ſeed time.

Whoever uſes this plough will find it anſwer the firſt hoeing extremely well, as it will leave whatever it hoes at two inches and a half diſtant; conſequently the ſecond hoeing, which muſt be by hand, will be very trifling; and often there will be no occaſion for it. I firſt hoe the long way of the land and then croſs it. The hoe I have is bare two inches; but I find it is too narrow.

a a. Plate XXVI. Fig. 5. are the two out-ſides of the hoe, which are flat, and ſo go on the out-ſide of the block on the common horſe-hoe at A A, Fig. 4.

b, Goes on a mortiſe at the bottom of the block, at *b*.

c, the pin goes through the holes on the flat ſide of the hoe at *a a* and the block A A.

d, d, d, The cutting parts two inches and a half wide; and leaves a ſpace of two inches and a half:

E, A chain that hooks to a ſtaple on the beam, and keeps all ſteady. I have ploughed ten inches deep with this hoe.

F, F, Two bars of iron worked in to the three uprights.

I always uſe the harrow belonging to the common horſe-hoe with the above. I ſometimes fix M. De Villier's cultivator to the above carriage. I have a field of twenty-two acres of wheat, in which is ſixteen different ways of ſowing, preparing the ſeed, and manuring the land."

TURNIP-CABBAGE, the name of a ſpecies of cabbage, ſo called becauſe the ſtalk, at ſome diſtance from the ground, after riſing of the uſual thickneſs, and in the manner of thoſe of other cabbages, enlarges ſuddenly to ſuch a degree, that it forms a knob of a very large turnip; of which likewiſe it has ſometimes the figure, though it is, in general, more oblong.

By this peculiar formation of the ſtalk, or production of the turnip-like knob, together with its being perennial, this ſpecies of cabbage is diſtinguiſhed from all others. From the top of this turnip riſe a number of leaves, of a greeniſh-red, or ſometimes greeniſh-purple colour; which anſwer to the radical leaves in other plants. They do not, though this plant is truly of the cabbage kind, ever cloſe together, and form a compact globular or oblong maſs, as in the common ſpecies; but keep their erect growth, or turn outwards.

From among theſe leaves ſpring a number of other ſtalks, of which thoſe that are nearer the extremity, branch, and ſend out flower ſtalks, ſpreading horizontally; and thoſe that are more in the center, grow erect, and without branches. On theſe ſtalks are leaves, ſpringing out alternately, and of the ſame colour with the others. The flowers are ſmall and yellow, and ſucceeded by long cods, full of ſeed, of the ſize of that of muſtard, and a light-brown colour. We have given a figure of this plant on Plate XXVI. Fig. 6.

It may be juſtly doubted, whether or no this plant be originally a native of our country: though it is at preſent found growing wild in ſome places near Dover. But, from its general character, which does not agree with the indigenous plants of the ſame kind; from its being unknown to the earlier botanic writers, or, at moſt, known only in the view of an exotic; and from its being now to be met with wild, only in the one place mentioned, it is moſt probable, that what is there found was the produce of ſeed conveyed originally thither by ſome accident; and which has ſince propagated itſelf, and ſpread ſpontaneouſly, as it eaſily might, from its perennial nature and extreme hardineſs. It is frequently cultivated in gardens, where there are collections of vegetables: but, for the moſt part, rather as a curious than an eſculent plant. Though certainly, the turnip, or knob, is at leaſt as wholeſome as either any turnip or cabbage, and is much liked by ſome; and the leaves are alſo thought good by others; but, in general, both are ſaid to be ſtrong, and ſeldom admitted to the table with us. This plant, however, affords ſprouts, which, after they have undergone the action of a ſtrong froſt, are exceeding good; and may conſequently be had at that time when all others fail. The lying in very ſmall room, proportionably to the quantity of ſolid ſubſtance, and the keeping good much longer than any other ſort of vegetable of a ſimilar nature, are qualities, moreover, which fit this plant in a moſt peculiar manner for the uſe of ſeamen, as is ingeniouſly remarked by Mr. Baker, in his report to the Dublin Society. *See the article* TURNIP.

It appears from Gerard, that there were, in his time, two kinds of this plant; one of which he calls *caulorapum rotundum* or round rape-cole; and the other *caulorapum longum*, or long rape-cole. The difference of theſe two kinds conſiſted only in the form of the knob or turnip, as is expreſſed by the names themſelves; and in the long kind's ſhooting forth ſmooth indented leaves from the turnip part, which leaves the round kind wanted. I have here ſent you a ſketch of theſe two kinds, according to the prints Gerard has exhibited of them; and they may ſerve alſo to give ſome idea of the general figure of the plant, to thoſe who have never met with it.

I have not however ſeen in any garden, nor find any traces in the late writers, of more than one kind of this plant: ſo that if the round and long kinds, mentioned in this manner by Gerard, were really different ſpecies, the long is now loſt. But it ſeems more probable, that this was only a degeneracy of the plant, by means of the farina of the common kinds of cabbage; as the deviation from the round knob towards the plain ſtalk, and the breaking out of the leaves from it ſeem to indicate.

If there really were two original kinds, or this difference aroſe from a permanent ſeminal variation, it would merit attention under the preſent circumſtances to recover them; ſince it frequently happens in correſpondent caſes, that where there are two allied ſpecies, the one has qualities which fit it to a particular purpoſe in a very ſuperior degree to the other. This plant was rare in Gerard's time in our country; as he mentions his having the ſeed from Spain: and indeed it was ſo little known, that he ſays it is to be ſown and ſet as cucumbers and melons; and that it was then accounted a dainty meat. It did not however make its way to the table in common, or even as a curioſity in gardens, much more at that time than ſince. For Parkinſon, who wrote after Gerard, and enumerates many more ſpecies of cabbage than his predeceſſor, does not take the leaſt notice of it. Tournefort, and moſt of the later writers, mention this plant under various names; but they do little more with regard to it, than give the name and Deſcription. Miller, in his Gardener's Dictionary, ſays,

ſays, this kind of cabbage "never varies, for I have cultivated it many years, and have not found it to alter. It grows naturally on the ſea-ſide, near Dover. It hath a perennial branching ſtalk, in which it differs from all other ſpecies. I have cultivated it theſe three or four years, and have eaten the young ſhoots, after they have been much frozen, when they were very ſweet and good; but at other times they are very ſtrong and ſtringy. In very ſevere winters, where the other ſorts are deſtroyed, this is a very neceſſary plant, for the moſt ſevere froſts do not injure it."

Till lately we ſee, therefore, this plant was only conſidered, either as a kind of curioſity in botanic, or other gardens, where there were collections of different kinds of plants, or as an eſculent herb: but in this latter view, it ſeems not to have acquired any great reputation, as it is ſo ſeldom, even notwithſtanding Miller's recommendation, met with on the table here; though I am well informed, that in ſome of the factories in the Eaſt-Indies, it has been cultivated from European ſeed, and is much liked.

The firſt public notice I find taken of this plant, in the preſent view of cultivating it for feeding cattle, is in a pamphlet publiſhed by the late Mr. North, gardener, near Lambeth, who ſpeaks of it under the article of cabbage; of which he ſays, "There are four ſpecies that may be cultivated to great advantage for cattle; to wit, the white cabbage, the hardy curled Savoy cabbage, the turnip cabbage, and the green curled cabbage." When he comes to treat particularly of the turnip-cabbage, he thus expreſſes himſelf: "The turnip-cabbage is one of the hardieſt roots that grow; and I dare affirm, might be propagated to great advantage for feeding ſheep, &c. For in the moſt ſevere winter that I can remember, when cabbages, ſavoys, turnips, &c. have all been demoliſhed by the extremity of the weather, the turnip-cabbages have not been hurt. The turnip part grows all above ground, which is crowned with many large ſmooth leaves, like thoſe of the red cabbage, but which grow open like the tops of turnips. They are a very ſolid juicy root, and do not grow ſpongy when they are old as turnips do. The tops may be cut off, and given to ſheep, &c. in the ſpring, and the roots laid by in an out-houſe to feed them in April and May, when no other roots can be had. Sheep are ſo fond of theſe roots, that they will leave the beſt turnips for them. When they are given to ſheep, they ſhould be cut to pieces; but they will eat them faſt enough, tops and bottoms, as they are growing in the fields. After Michaelmas, when turnip-cabbages have their full growth, they will weigh from four to eight pounds a piece."

It may be proper here to caution againſt a miſconception, from the inaccuracy of an expreſſion of Mr. North's, in calling the turnip-like part of this plant, a root; for it is no more than an enlargement of the ſtalk in that part; being, when the plants are large, ſeveral inches above the ground. It is proper to obſerve likewiſe, that Mr. North has under-rated the weight of theſe plants; it appearing, by Mr. Baker's account, that ſome weigh fourteen or fifteen pounds. This is the firſt notice I find in any publiſhed worked, of this plant's being conſidered as proper for feeding cattle: but it appears in the minutes of the ſociety's books, that ſome little time before the publication of this pamphlet, on the enquiry ſet on foot by the late Mr. Wych, concerning a proper food for cattle in hard winters, this plant, together with the Chineſe or white vetch, and the Siberian medicago, were propoſed to the Committee of Agriculture for their conſideration, by a gentleman well known to that ſociety; and this plant was particularly recommended for its hardineſs in the ground, its quality of not rotting, though long kept, its nutritive property, and the fondneſs which cattle ſhew for it when offered to them as food.

Mr. Baker, nevertheleſs, whoſe report on this ſubject to the Dublin Society, the reader will find under the article TURNIP, muſt have the honour of being the firſt who really introduced this plant into uſe, as an article of huſbandry. For it was on the authority of his judicious experiments, related in that report, the ſame gentleman, who formerly recommended the turnip-cabbage, as above-mentioned, to the London Society, induced them laſt year to offer a premium for its culture: and there is no one object of a ſimilar nature, hitherto taken into conſideration, either by this ſociety, or that of Dublin, which bids fairer for being of great public utility: as this plant ſeems to anſwer all the ends of what was ſought for, with ſo much pains and attention, in the reſearch ſet on foot by Mr. Wych, after a proper winter pabulum (as it was called by him) for cattle in ſcarce winters.

The turnip cabbage may be cultivated in the manner of other cabbages; of which the particulars may be ſeen under the article CABBAGE. But the ſucceſs Mr. Baker had with his method, particularly in relation to the magnitude of the turnip, which ſeems to go far beyond Mr. North's notion, recommends ſtrongly the trial of that manner; except that, as he properly remarks, where the plants are raiſed in the ſpring, the ſeed ſhould be ſown in the very beginning of March; the plantlings, tranſplanted to a proper cloſe bed, as ſoon as they are ſufficiently ſtrong to bear it; and the final tranſplantation of them out into the field at the diſtances in which they are to grow, ſhould not be deferred later than the beginning of June. This would both give more time for the plants to become large before winter, and a better chance to avoid a total want of rain, after tranſplanting; the only accident, except the deſtruction by caterpillars, or other inſects, to which this kind of crop is ſubject; as the plants bid defiance, after they have firmly taken root, to all inclemencies of weather, either with reſpect to cold, wet, or drought.

It may be inferred from the above particulars, which, as we ſee, ſtand on unqueſtionable authority, that, conſidered as an article of huſbandry, this plant muſt be a very valuable acquiſition; as it is of eaſy culture, and as little ſubject to fail by accidents, as any crop whatever: as the produce with reſpect to quantity, is likely to prove, under favourable circumſtances, thirty-five or thirty-ſix tons per acre, as appears from Mr. Baker's account: as its produce is greatly preferable either to turnips or other cabbages; being much more nutritious, and leſs watry and cold; a fault in the common turnips: as it may be depended on in the moſt rigorous and ſevere ſeaſon, when every thing elſe but dry fodder fails, and may be taken from the place of growth, in caſe of exigence, whenever the ground is not covered with a very deep ſnow: and as it is much liked by neat cattle, ſheep, deer, and hogs; agrees perfectly well with all of them; and fattens them in the moſt profitable manner. This is certainly very ſufficient ground of recommendation, as an object of premium, to the London Society; and it is hoped will be ſo, as a ſubject of experiment and trial to thoſe gentleman, or more liberal kind of farmers, who attempt improvements in huſbandry.

I have

I have thus endeavoured to give all the light I can into the nature of this plant, conſidered as an article of huſbandry: but before I conclude, I muſt beg leave to ſubjoin a few words reſpecting it in another view, of ſuch importance to a particular ſet of men, whoſe health and ſafety manifold reaſons recommend to the care of the public, as makes it merit a very ſerious conſideration. What I allude to is, the intimation given by Mr. Baker, of the probability that this plant might be rendered extremely ſerviceable to ſeamen in long voyages. As there can be no doubt of the juſt foundation of this opinion, it ought to be kept in ſight as much as poſſible, till the matter be realized in practice. The putrid ſcurvy, ariſing from the eating ſalt proviſions, is the great bane of a ſea-faring life. The numbers diſabled or carried off by it, particularly in time of war, are almoſt incredible; and, if we conſider the public value of lives ſo loſt, both with reſpect to the national power and expence, policy, as well as humanity, bids us liſten to every feaſible propoſal for mitigating this evil. The uſe of vegetables in the diet along with the ſalt-beef or pork, is well known to be one of the moſt effectual means of prevention of this diſeaſe: and indeed, it has been ſo well underſtood, that great quantities of cabbages, &c. have been ſent off to the fleets cruiſing in the bay, or elſewhere within reach, to the great relief and refreſhment of the men. But this ſpecies of cabbage, abounding more in the ſaccharine juice than the other kinds, would be a more efficacious preventative or palliative of the ſcurvy; and the ſolid compact texture of theſe turnips, which makes a conſiderable weight, lye in a ſmall compaſs, together with their repugnance to that putrefaction, to which other turnips, cabbages, &c. are quickly diſpoſed, renders it practicable to keep them on ſhipboard, in any climate, for many months; provided they be preſerved from the acceſs of any extraordinary degree of moiſture.

If this plant ſhould be, therefore, generally cultivated the field-way, and conſequently produced at a very cheap rate, as Mr. Baker has ſhewn, that betwixt thirty and forty tons may be obtained by an eaſy method of culture in one year, from one acre of ground, they might be purchaſed at a much cheaper rate than any other article of proviſion at preſent in uſe for the victualling of ſhips.

This ſeems to be an object very well worth the conſideration of the India company; as it might be a means of preventing that delay and ill ſucceſs of ſome voyages, which ariſe from the ſickneſs of the men; and it is attended with no difficulty, but what regards the ſtowage. For the plant being already cultivated in ſome of the factories in the Eaſt-Indies, where it ſucceeds as well as here, and conſequently might in all the others, as no climate or ſeaſon appears injurious to its growth, it might be procured at a proportionably cheap rate, as well for the ſupply of the homeward as outward bound ſhips: and indeed, conſidering the nature and ſtate of the proviſions on board ſhips returning from India, it would undoubtedly be peculiarly beneficial in that caſe. *Muſeum Ruſticum, vol.* VI. *pag.* 46.

TURPETH, a ſpecies of the convolvulus or bindweed. *See the article* BINDWEED.

TWIFALLOWING, or TWYFALLOWING, ploughing the ground a ſecond time, which is generally done in June.

V.

VALE, low ground; a valley.

VAN, an inſtrument to winnow corn. *See the article* THRESHING.

VASCULIFEROUS PLANTS, ſuch whoſe ſeeds are contained in veſſels divided into cells.

VAT, *or* FAT, a veſſel for holding wine, ale, beer, cyder, &c. in the time of their preparation.

UDDER, that part of a cow, mare, ewe, &c. where the milk is prepared, anſwering to the breaſts in women.

VEGETABLE, a term applied to all plants, conſidered as capable of growth, *i. e.* all natural bodies which have parts organically formed for generation and accretion, but not ſenſation.

Vegetables, according to the analyſes made of them by chemiſtry, are diſtinguiſhable into two grand tribes, the acid and the alkaline; the firſt affording a volatile acid, and the ſecond a volatile alkali, upon a dry diſtillation: thus guaiacum, cedar, box, cinnamon, cloves, ſorrel, mint, balm, &c. afford an acid; but garlic, onions, horſeraddiſh, ſcurvy-graſs, muſtard, &c. afford an alkali, which, rectified, is hardly diſtinguiſhable from that of animal ſubſtances, ſo as nearly to reſemble the ſpirit and ſalt of hartſhorn.

VEGETATION, the act whereby plants receive their nouriſhment and growths; of which, three principal functions are underſtood, viz. nutrition, increaſe, and generation.

From Scripture we learn, that the earth has been endued, from the beginning, with a certain ſeminal virtue to produce plants; which virtue, proceeding from God, was not confined to the firſt production of things, but extends likewiſe to all future conſequences of times; and this

faculty which the earth has of producing plants, is from this commandment of the Almighty: "Let the earth bring forth graſs, the herb yielding ſeed, and the fruit-tree yielding fruit after his kind, whoſe ſeed is in itſelf upon the earth; and it was ſo." Gen. i. 11.

Philoſophers aſk, what can be that virtue the earth is ſaid to be endued with, if it be only an inherent quality whereby it produces, naturally, all ſorts of plants, without the concurrence of ſeed? or if a ſeminal virtue (or ſeed) muſt be adminiſtered to it? Some follow the firſt opinion, for this reaſon, that earth dug up from a great depth and put into pots, after a ſet time or ſeaſon, produces ſeveral ſorts of plants of itſelf without ſeed; but though this opinion be approved of by many, it has not, however, the leaſt appearance of probability on its ſide; for who (conſidering with attention the progreſs of nature, ſees the marvellous mechaniſm of the organs of plants, the whole texture of their internal as well as external parts) could be perſuaded to attribute it to a heavy and indigeſted maſs of clay or earth: therefore, it is more rational to ſay, that plants have their origin from ſeeds, which being taken from the firſt plants, have propagated their ſpecies by the Creator's will, as far as our times, and will continue to do ſo (particularly where they are natives) to the end of the world.

The ſun, rain, the exhalations of the earth, and the reſt of the exterior cauſes, are capable to excite a certain motion or fermentation in the boſom of the earth; but unleſs there be a ſeed which contains already the conformation of the plant, whoſe parts are unfolded by that fermentation, never ſuch fermentation or motion can give origin to the plant; therefore, we have great reaſon to think, that all plants have their origin from ſeeds, actually or potentially, ſince the firſt rudiments of a plant can be diſcovered no where elſe, nor by the naked eye, nor even by the help of a microſcope; ſo that the ſeed contains not only the coarſer matter of the plant, with its organical parts, which have the ratio of a body, but likewiſe a certain ſpirit, that is, an active and vegetative ſubſtance, which may be called the ſoul of the plant. Although, in ſome manner, it may be ſaid to ſleep in the grain or ſeed, yet when excited to motion by the heat of the ſun, the warmth of the earth, and with rain impregnated with particles of volatile ſalts, it then unfolds its parts, and puſhes the embryo plant forward.

A ſprig or cutting muſt contain in it this ſeminal property, for being ſet at a proper ſeaſon, it produces a tree with all its generative parts; which it would not do were it not endued with ſome ſeminal virtues.

This generative or ſeminal faculty, is a power of the vegetative ſoul of a plant, by which it lives, and produces its likeneſs for the preſervation of the ſpecies: but this faculty is not diſcernable from the ſeed itſelf, nor from the ſpirit contained therein, for as the ſeed is ſaid to be a part of ſome ſubſtance, deſigned for the production of another ſubſtance of the ſame ſpecies, it is not abſolutely neceſſary to diſtinguiſh that prolific virtue from the ſeed itſelf, nor from the ſpirit contained in it; for after the ſeed is ſown and ſoftened by the warmth and humidity of the earth, its germ (wherein the plant is contained, as in an epitome) is unfolded by a gentle fermentation, and ariſes into a plant.

That the heat of the ſun, and the temperate warmth and humidity of the earth, are the firſt principles of vegetation, appears from the ſterility or fertility of the ſoil in thoſe climates where theſe two principal agents act, or do not act in concert; ſince, in the moſt northern countries, where the humidity of the ſoil is exceſſive, and its natural warmth is too much concentered, the fermentation of the ſeed being made with too much precipitation, and without that gradation neceſſary for the eaſy and moſt perfect expanſion of the different parts of the plant, thereby they are fruſtrated of that ſtrength they ſhould have before they come out of the matrix it has been formed in to reſiſt the injuries of the air and the inconſtancies of the ſeaſons, it periſhes almoſt as ſoon as it appears on the ſurface of the earth; for although the earth has in ſome meaſure, though very imperfectly, acted its part (as it cannot alone, and without the aſſiſtance of the ſun, carry the plant to its laſt perfection) that tender parent of nature, by the obliquity of its ſituation, being reduced to the incapacity of darting its rays as favourably and abundantly in thoſe climates as he does in others more happily ſituated, cannot either help the mother earth in her pregnancy, nor rectify what ſhe has left imperfect in her productions, which therefore die almoſt as ſoon as nature itſelf is appriſed of their exiſtence.

Likewiſe in thoſe other climates ſituated quite different from theſe where the ſun, by being too profuſe of its influences, penetrates the inmoſt parts of the womb of the earth, and by its too violent and too often repeated acts, and exalting its ſalts, and evaporating its radical humidity, cauſes an exceſſive dilation of its pores, a diſunion, and but too often an entire laceration of its generative parts, ſo as to render them quite ſteril or barren, and therefore incapable to contribute to that fermentation abſolutely neceſſary for the production of plants.

On the contrary, in thoſe happy climates where the parts of the earth are ſo ſituated in reſpect to the ſun as to be under his moſt favourable aſpect, and expoſed to none but his moſt benign influences, it almoſt always continues in its natural flouriſhing ſtate, being ſeldom viſited by the moſt powerful and penetrating beams of the ſun, but at thoſe regular and periodical times appointed by nature for its pregnancy, when they are neceſſary to excite her fœcundity, or to nouriſh and cheriſh her productions when once brought forth.

Suppoſe our ſeed to have been ſown in this laſt ſoil, and ſituation, the firſt things which preſent themſelves to the imagination are the ſun and earth concerting together, the one by its heat, and the other by her moiſture, how to rid the embryo of that hard tough ſubſtance it is enwrapped in, and which is the greateſt obſtacle to the burſting forth of its parts; therefore the earth, which is the firſt agent in this caſe, and which is to do the office of incubation, makes uſe firſt of its natural moiſture to ſoften the outer rind or huſk, by having it percolated through the pores or pipes of the ſaid huſk, whereby they are ſo opened and dilated as to facilitate the introduction of the different ſalts appointed to operate on the whole ſubſtance of the ſeed, by unfolding the different parts it contains, and diſpoſing them ſeverally towards aſſuming their reſpective forms.

It cannot be imagined that the earth acts alone in this firſt operation, that it could direct itſelf to action without the concurrence of the ſun, which on this occaſion excites, by a gentle warmth, the different ſalts the moiſture of the earth is impregnated with, that they may be capable to conquer the ſtubbornneſs of the huſk, by forcing themſelves into its almoſt imperceptible pores, conquering all the

the obſtacles, and raiſing all the obſtructions which the ſeveral ſubſtances may meet with; by this means a free paſſage being opened for ſuch a quantity of the moiſture as is neceſſary to make a due ſeparation of the huſk from the more eſſential part of the ſeed, the ſalts employed in that operation being volatilized or already fixed on that eſſential part, leave the huſk filled with nothing elſe but the lympha, which groweth turgid, and being deprived of the nouriſhment it received when united to the ſubſtance of the ſeed, begins to tend towards its deſtruction.

The following procedure in the vegetation of plants is exemplified by Malpighi in a grain of wheat; the firſt day the grain is ſown it grows a little turgid, and the ſecundine, or huſk, gapes a little in ſeveral places, and the body of the plant being continued by the umbilical veſſel to a conglobated leaf (which is called the pulp or fleſh of the ſeed, and is what conſtitutes the flour) ſwells, by which means not only the germ or ſprout (which is to be the future ſtem) opens and increaſes, but the roots begin to bunch out, whence the placenta, or ſeed-leaf, becoming looſe gapes. The ſecond day the ſecundine or huſk being broken thro', the ſtem or top of the future ſtraw appears on the outſide thereof, and grows upwards by degrees; in the mean time, the ſeed-leaf guarding the roots becomes turgid with its veſiculæ, and puts forth a white down, and the leaf being pulled away, you may ſee the roots of the plant bare, the future bud, leaves, and the reſt of the ſtalk lying ſtill hid. Between the roots and aſcending ſtem, the trunk of the plant is knit by the naval knot to the flower-leaf, which is very moiſt, though it ſtill retains its white colour and its natural taſte. The third day the pulp of the conglobated or round leaf becomes turgid with the juice it has received from the earth fermenting with its own; thus the plant increaſes in bigneſs, and in its bud or ſtem becomes taller, and from whitiſh becomes greeniſh, the lateral roots alſo break forth greeniſh and pyramidal from the gaping ſheaf which adheres cloſely to the plant, and the lower roots grow longer and hairy, with many fibres growing out of the ſame; indeed there are hairy fibres hanging on all the roots, except on the tops, and theſe fibres are ſeen to wind about the ſaline particles of the ſoil, little lumps of earth, &c. like ivy, whence they grow curled about the latent roots, and then break out into two other little ones. The fourth day the ſtem mounting upwards, makes a right angle with the ſeminal leaf, the laſt roots put forth more, and the other three growing larger are cloathed with more hairs, which ſtraitly embrace the lumps of earth, and where they meet with any vacuity, unite into a kind of net-work; the conglobate or flower-leaf is now ſofter, and when bruiſed yields a white ſweetiſh juice, like barley cream; by ſtripping it off, the root and ſtem of the plant are plainly ſeen, with the intermediate navel-knot, whoſe outer part is ſolid like a bark, and in the inner more ſoft and medullary. The fifth day the ſtalk ſtill riſing puts forth a permanent or ſtable leaf, which is green and folded, the roots grow longer, and there appears a new tumour of a future root, the outer ſheath is looſened, and the ſeed-leaf begins to fade. The ſixth day the ſtable leaf being looſened, the plant mounts upwards, the ſheaf ſtill cleaving round it like a bark; the ſeed-leaf is now ſeen ſinuous or wrinkled and faded, and this being freed or cut from the ſecundine, the fleſh, or pericarpium is found of a different texture, the outer part, whereby the outſide of the ſeed or grain is heaped up, being more ſolid, but the inſide viſcular and full of humour, eſpecially that part next the navel-knot. All the leaves being pulled off, the roots torn, and the flower-leaf removed, the trunk appears, wherein, not far from the roots, the navel-knot bunches out, which is ſolid and hard to cut; above there is a mark of the ſheath-leaf, which was pulled, and underneath, as in an armpit, the germ is often hid; the hind part of the plant ſhews the breaking forth of the roots likewiſe, with the faded placenta, &c. After the eleventh day, the ſeed-leaf as yet ſticking to the plant, is crumpled and almoſt corrupted; within it is hollow, and about the ſecundine the mucus and white ſubſtance of the ſeed being continued to the navel-knot, forms a cavity, all the roots becoming longer, put forth new branches out of their ſides, the ſecond leaf withers, and its veſicles are emptied; the internodes, or ſpaces between the knots, grow longer; new germs appear, and the middle root grows ſeveral inches longer. After a month, the roots and ſtalk being grown much longer, new buds break out at the firſt knot, and little tumours bunch out, which at length break out into roots.

Thus, according to Malpighi, in this ſhort ſpace of time, the plant paſſes through all theſe various changes and mutations, which, though his obſervations may be real as here repreſented, yet it does not happen with ſuch celerity in all ſorts of plants, though in ſome kinds all theſe variations may come to paſs in a ſhorter time.

The plant carried thus far, it ſtill wants food for the future preſervation of its vegetative life, which being deprived of ſuch nutriment, it cannot exiſt; of which naturaliſts are ſo ſenſible, that their common opinion is, that water is the great vegetable food, which they endeavour to confirm by repeated experiments, eſpecially by that made on a ſprig of baum, mint, &c. which being ſet in a phial of pure water, without any mixture of earth, grow and put forth roots, leaves, and branches; without conſidering, that thoſe ſorts of plants being of a ſhort duration, the juices which they have received from their mother earth in their firſt formation circulating through their veſſels, being continually recruited by the ſalts the water they are ſet in is impregnated with, together with thoſe they receive continually from the ambient atmoſphere, are more than ſufficient for the ſupport of their ſhort life in the water, which ſubſiſts no longer than that the water continues to ſupply them with ſalts of which when once exhauſted, it grows viſcous, obſtructs the pores of the veſſels, and hinders thereby the admiſſion of ſalts even from the atmoſphere, imbecillitate by degrees the functions of the vegetative ſoul, which being forced for ſome time to feed on its own ſubſtance, becomes at laſt enervated and impotent, whereby the plant withers and dies for want of food, unleſs the water is changed before it comes to the laſt period, which appears at its growing offenſive to the ſmell; even that precaution becomes uſeleſs, at leaſt for the greateſt part.

Thoſe ſalts the water is impregnated with, being heterogeneous to thoſe which enter into the compoſition of the juices, which circulate through the veſſels of the plant, have ſoon, by diſordering the whole frame of that mechaniſm, procured the extinction of the plant.

The great quantity of oleaginous particles thoſe ſorts of plants are compoſed of, which keep their pores extremely dilated for the admiſſion of ſalts and other nutritive particles, contribute much towards the production of this phænomenon; but in plants of a cloſer texture, whoſe pores are ſo exiguous as not to be forced, but by the impetuo-

ſity of ſalts exalted and volatilized, beſt by the warmth of the earth and the heat of the ſun, this experiment is of no effect; therefore, water cannot be ſimply conſidered as the great vegetable food, although it has a very conſiderable ſhare in the nutriment of plants: but were it water alone, to which vegetables owe their increaſe, there would be no need of manures nor changing the kinds. The rain falls in all places upon the moſt barren land, as well as on the moſt fertile; nor could there be any reaſon why the ſame field ſhould yield a large crop of wheat one year, and not the next, ſince rain ſhowers down nearly alike on the earth.

VELLING, ploughing, or cutting up the turf, or upper ſurface of the ground in order to its being burnt. *See the article* BURNBAKING.

VENTILATOR, a machine by which the noxious air of any cloſe place (as an hoſpital, jail, ſhip, chamber, granary, &c.) may be changed for freſh air.

The noxious qualities of bad air have been long known, though not ſufficiently attended to, in practice; but it is to be hoped, that the indefatigable pains taken by Dr. Hales, to ſet the miſchiefs ariſing from foul air in a juſt light, and the remedy he has propoſed by the uſe of his ventilators, will at length prevail over that unaccountable ſloth or obſtinacy, which, where particular intereſts are not concerned, ſeems to poſſeſs the generality of mankind, and which rarely allows them to give due attention to any new diſcovery.

The ventilators invented by that ingenious gentleman conſiſt of a ſquare box, A B C D (plate XXVI. fig. 7.) about ten feet long, five wide, and two deep; in the middle of which is placed a broad partition, or midriff, made to move up and down, from A to C, on hinges at the end E, by means of an iron rod Z R, fixed to the midriff at Z.

Another box, of the ſame ſize with the former, having a like midriff, bar, &c. is placed near the former (fig. 8.) with its rod, R Z. Both theſe rods are fixed to a lever F G, moveable on the center O; ſo that by the alternate riſing and depreſſing of the lever F G, the midriffs are alſo raiſed and depreſſed alternately, by which means theſe double bellows are at the ſame time both drawing and pouring out the air.

That the midriffs may be rendered lighter, they may be made of four bars, lengthwiſe, and as many placed acroſs them, each about three inches broad, and an inch thick, the vacant ſpaces being filled up with thin pannels of fir board.

In order to make the midriffs move with greater eaſe, and without touching the ſides of the boxes, there is an iron regulator N L (fig. 7.) fixed upright to the end A C of the box. As very little air will eſcape if the edges of the midriff be within one twentieth part of an inch from the ſides of the box, there is no neceſſity for leathern ſides, as in common bellows. The end A C of the box muſt be ſomewhat circular, that it may be the better adapted to the riſing and falling of the midriff; and at the other end of the midriff a ſlip of leather may be nailed over the hinges.

To the ventilators above deſcribed, eight valves are adapted for the air to paſs through; theſe valves are placed at the hinge end I Q, fig. 8. numbered 1, 2, 3, 4, &c. The valve 1 opens inward, to admit the air to enter, when the midriff is depreſſed at the other end, by means of the lever F G; and at the ſame time the valve 3, in the lower ventilator, is ſhut by the compreſſed air, which paſſes out at the valve 4: but when that midriff is raiſed, the valve 1 ſhuts, and the air paſſes out at the valve 2. The ſame is to be obſerved of the valves 5, 6, 7, 8, of the other box; ſo that when, by the motion of the lever F G, the midriffs are alternately riſing and falling, then two of the ventilators are conſtantly drawing in the air, and two of them at the ſame time are blowing it out at their proper valves, the air entering at the valves 1, 3, 6, 8, and paſſing out at the valves, 2, 4, 5, 7. To the ventilators, before the valves, is fixed a hook Q Q M M (fig. 9.) as a common receptacle for all the air that comes out of theſe valves, which air is conveyed away through the trunk P, paſſing through the wall of a building, &c.

It would be foreign to the intention of this work to point out the various uſes of theſe machines in extracting foul air out of ſhips, hoſpitals, &c. but we muſt not omit the following

Experiments on the Preſervation of Corn by Ventilation.

M. Duhamel cauſed a caſe, or little granary of preſervation, to be made of oak plank two inches thick, forming a cube of five feet every way. At ſix inches from the bottom was a flooring, or ſecond bottom, of lattice work, placed upon joiſts five inches thick, and covered with a ſtrong canvas. This ſmall granary was filled quite full of good wheat, of which it contained 94 cubic feet, weighing 5040 pounds. It was covered with good oak planks, ſo cloſely joined, that neither rats, mice, or even the ſmalleſt inſects could get in; leaving only ſome vent-holes, with trap doors, or covers, fitted very exactly to them, as mentioned before.

This corn, laid up without having been dried at all by fire, was not ventilated more than ſix days in a year, which was ſufficient to keep it ſo well that the beſt judges allowed it to be as good as could be. Even when the bellows had not been worked for ſeveral months, the corn was ſtill allowed, by good judges, to look and ſmell perfectly well: but they objected, that it did not handle well, that is, that there was ſome little dampneſs in it. The bellows were worked for half a day, and this objection was entirely removed.

This wheat was old, and had been as well dried as any corn generally is in a common granary: therefore it being ſtill damp, at the end of a conſiderable time, ſhews the neceſſity of taking away the ſuperfluous moiſture, and of reducing our corn to the ſame degree of dryneſs, as that of the hotteſt countries, in order to preſerve it in great bodies.

Experiment on ninety-four Cubic Feet of Wheat.

In May, 1743, ninety-four cubic feet of wheat were put into one of the little granaries before-mentioned. It was of the harveſt of 1742, of an excellent quality, perfectly clean, and ſo dry, that a ſmall parcel of it which was put, for a trial, into a ſtove heated to fifty degrees of M. de Réaumur's thermometer (123 of Farenheit's) loſt but one ſixteenth of its weight. This wheat was well cleanſed from duſt, and depoſited in the granary without being dried by fire.

During the firſt three months, it was ventilated for eight hours once a fortnight: during the reſt of the year 1743, and

and all 1744, it was ventilated once a month: all the year 1745, and part of 1746, it was ventilated half a day once a month; and after that, but once in two or three months.

In June 1750, the granary was emptied, and the wheat looked and ſmelt very well, but felt a little rough in the hand, becauſe, not having been ſtirred for ſix years, the little hairs that are at the extremity of the grain, and the particles of the bran were roughed up: but after paſſing twice through the wind ſcreen, that objection was entirely removed *See the article* THRASHING.

This corn was eight years old, during ſeven of which it was preſerved in one of M. Duhamel's ſmall granaries, without any ſenſible diminution, and without any damage from vermin or inſects: we cannot ſay abſolutely, without any expence, becauſe a man was employed from time to time to ventilate it. But this was a very trifling charge, and may be reduced almoſt to nothing, by working the bellows with ſwifts like thoſe of a mill.

Experiment on ſeventy-five cubic feet of new wheat, extremely moiſt, grown, and which had already contracted a bad ſmell.

The harveſt of 1745 was very rainy: almoſt all the wheat of that year was grown in the ear; the ſheaves were extremely wet when they were houſed; the grains adhered ſo cloſely to their huſks, that they were greatly bruiſed by the flail; and if they were left but a very little while upon the barn-floor, before they were cleanſed, they heated, and contracted a ſmell like that of pigeon's dung: in ſhort, they were ſo very moiſt, that they loſt an eighth part of their weight when dried in a ſtove heated to fifty degrees of M. de Réaumur's (one hundred and twenty-three of Farenheit's) thermometer; and when laid up in the common granaries, in the uſual way, they were always in a ſtate of fermentation, though but a foot thick, and turned every fourth or fifth day.

Seventy-five cubic feet of this grown wheat, which ſmelt very ill, and was ſo moiſt as to wet the floor of the granary where it laid but a few days, were put, in this condition, and without being dried by fire, into one of M. Duhamel's little granaries, with ſmall hopes of ſucceſs.

As this corn was very hot when put into the granary, it was ventilated three or four times the firſt week, and once a week during December and January: and as it had then loſt great part of its bad ſmell, it was ventilated but once a fortnight from that time till June. Then perceiving, by thruſting his hand into the top of the heap, that it heated, and concluding that it was going to be entirely corrupted, M. Duhamel ordered the granary to be emptied: but after the depth of about a foot had been taken from the top, he was greatly ſurpriſed to find the reſt cool, with very little bad ſmell, and drier than that which was preſerved in the common granaries.

The reaſon why the top of this corn was the worſt, was, undoubtedly, that the moiſt vapours were always forced upwards in ventilation. It therefore might, perhaps, have been kept very well, if, inſtead of emptying the granary, it had been ventilated oftener: for this would, probably, have dried away the remainining moiſture, even at the top, as the following experiment will ſhew. But however that might have been, this teaches us one important thing, which is, that the top of the heap is moſt ſubject to heat in this ſort of granary: ſo that if the grain taken out of the vent-doles is in good condition, it may be concluded that the reſt is ſtill better.

Experiment on five hundred and fifty-five cubic feet of wheat, very damp, mixed with ſmut, and which had contracted a bad ſmell.

The wheat of the year 1750 grew in almoſt continual wet; the harveſt was very rainy; and the ſame weather continuing all the year 1751, no pains that could be taken to turn the corn laid up in the common way, could dry it, or prevent its heating and contracting a bad ſmell. The wheat of this crop was likewiſe mixed with a conſiderable quantity of blighted and ſmutty grains, which always contain a great deal of moiſture, doubly difficult to be exhaled from them, and which ſoon makes them contract a bad ſmell, which they ſpeedily communicate to the ſound corn.

Five hundred and fifty-five cubic feet of this wheat were depoſited in one of M. Duhamel's granaries of preſervation, after being cleanſed with ſuch perfect care, that ſcarce any mark remained either of blight or ſmut among it; though theſe faulty grains amounted to near a ſixth part of the crop. But there ſtill remained a fine duſt, or powder, occaſioned by the moiſture, ſo cloſely adherent to the corn, that it could not be taken off by any means.

This wheat was laid four and a half or five feet thick in one of theſe granaries, the bellows of which were worked by a wind-mill; and as there was no want of wind during all the year 1751, and till the ſpring or 1752, the corn was often ventilated, without trouble or expence; by which means it was not only well dried, but alſo cleared of great part of its bad ſmell. It was indeed, when taken out of the granary, very full of duſt, which had fallen off the grains as their moiſture was exhaled: but this was then eaſily ſeparated by proper ſcreening, and the wheat proved ſo good, that the bakers bought it at the higheſt market price.

This experiment proves, that even very moiſt corn which has a great diſpoſition to ferment, may be preſerved by ventilation only: and as to the ſmutty grains with which this was mixed, the reverend Dr. Hales, after rightly obſerving that kiln-drying is apt to make wheat grind unkindly, propoſes the following method of drying ſmutty corn, after it has been waſhed; cold air not hurting it, as kiln-drying is found to do. "That I might be well aſſured, ſays that friend to all mankind, of the good effect of thus drying ſmutty corn, having procured a quantity of very ſmutty wheat, which weighed ſeven pounds and fifteen ounces, on the twenty-ſixth of May, at five in the morning, it was waſhed clean in four ſeveral waters, which was done in a few minutes, and was then laid to drain in an oat-ſieve, till half an hour after five; when it had encreaſed in weight, by wetting, ten ounces, beſides the moiſture that was equal to the weight of the ſmutt-balls and ſmut that was waſhed from the wheat. It waſted but two ounces and an half, by the firſt two hours ventilation; two ounces and five drachms in the ſecond two hours, viz. from eight to ten; in the next ſix hours, viz. from ten to four in the afternoon, it waſted at the rate of four ounces every two hours; from four to ſix, two ounces and an half, and from ſix to eight, one ounce and an half: in all, about twenty ounces; ſome allowance being made

made for what corn was waſted by handling and biting ſome of it from time to time. It was ventilated in theſe fourteen hours with about forty thouſand gallons of air, which paſſed upwards through it, and made it ſufficiently hard and dry, ſo as to be fit for grinding: it was well co loured, and handled well; and, from ſtinking, as ſmutty wheat does, it became much ſweeter. The viſible dewy moiſture was blown off in three hours; but it continued damp and cold to the feeling till two o'clock, when ſome little duſt began to fly off it.

"And whereas it waſted off much leſs moiſture during the firſt four hours ventilation, when it ought to have waſted the moſt, on account of its being then wetteſt, this was owing to the foggy hazineſs of the morning: which as it went off, and broke out into fine warm ſunſhine, towards ten o'clock, ſo the air being thereby become dry, it imbibed moiſture more ſtrongly from the corn: and that this was the true caſe of the difference, is farther confirmed by a like experiment which I had before made on a gallon of wheat, April the firſt, there being then a very dry north-eaſt wind.

"It will be adviſable to begin to ventilate corn as ſoon as poſſible after waſhing, that the moiſture may have the leſs time to ſoak in: for the leſs moiſture ſoaks in, ſo much the ſooner the corn will dry.

"If the moiſture is ſo eaſily carried off from wet wheat, by ventilation, this method will doubtleſs much improve what is called cold wheat, viz. ſuch as is grown, and has been houſed in a cold wet ſeaſon; and will therefore ſoon carry off the moiſt vapours which ariſe from corn, and which cauſe it to heat and grow muſty."

Other experiments on the preſervation of corn by ventilation.

The prior of the royal abbey of St. Stephen in Caen, filled a granary of preſervation twelve feet wide, thirteen feet long, and ſix feet deep, which forms a parallelipipede of nine hundred and thirty-ſix cubic feet, conſtructed according to M. Duhamel's directions, with wheat that had been kept all the winter in a common granary. It was cooled from time to time by two bellows, which two men worked by means of a lever; and though the place where this granary of preſervation ſtood, was neither ſo dry nor ſo airy as might have been wiſhed, the corn kept perfectly well in it.

In the beginning of September, 1754, M. Vandusfel filled one of M. Duhamel's granaries of preſervation, ſeven feet ſquare and ſix feet deep, with good wheat, undried. It heated a little at the end of eight days; but two men, with a ſmall double ventilator, cooled it in two hours time. It began to heat again about a week after, when he repeated the ſame operation, which cooled it preſently. By the twentieth of October it was quite cool, though it had not then been ventilated for fifteen days; and according to a letter of his writing to M. Duhamel, dated the fourteenth of October, 1756, it ſtill continued in the ſame good condition. Corn of the year 1754 and 1755, not dried, but only ventilated, had likewiſe kept with him as well as could be wiſhed.

VERJUICE, a liquor obtained from grapes or apples too acid for wine or cider. It is generally made in England from the juice of the crab, or wild apple.

VERMIN, a collective name including all kinds of ſmall animals, that are troubleſome to men, beaſts, corn, fruits, &c.

VERNAL, ſomething belonging to the ſpring ſeaſon.

VETCH, the name of a well known plant, much cultivated in many parts of England, and of which there are ſeveral ſpecies.

Some ſorts of this plant, the ſeeds of which ripen in autumn, grow naturally in moſt parts of England, in ſhady places among buſhes, and by the ſides of woods. The roots of theſe are perennial; but their ſtalks are annual, weak, and grow to ſo great a length, (for they will climb up to the height of ſix or eight feet wherever the tendrils which proceed from the end of their leaves can lay hold of boughs, branches, or the ſide of a hedge, to ſupport them) that they are hardly fit to be cultivated in the field, though ſome writers have recommended them for this purpoſe: for as they cannot be ſupported there, they will trail ſo much upon the ground, that they will be apt to rot: nor do their ſhoots, which are leſs ſucculent than thoſe of the vetch commonly raiſed, grow to a ſufficient height to be cut for uſe till late in the ſpring, when there is little want of green food for cattle.

Mr. Miller, after ſowing for many years the common vetch or tare, which is much cultivated in the fields for fodder, ſeems to think that which has black ſeeds, a diſtinct ſpecies from the white: for he has never found either of them vary. Both theſe are annual, and periſh ſoon after they have perfected their ſeed. Their ſtalks are angular, ſtreaked, and hairy: they are weak, and want ſupport, and generally trail upon the ground when they do not find any thing to faſten themſelves to. Their leaves are compoſed of ſeveral pair of blunt lobes, and are terminated by tendrils. The flowers, which are pretty large, proceed from the wings of the ſtalk, and ſit very cloſe to the baſe of the foot ſtalks of the leaves. Two of theſe flowers generally ſpring from the ſame joint: thoſe of the black ſeeded ſort are purple, and thoſe of the white ſeeded are white. They appear in June and July, and are ſucceeded by erect pods, containing three or four round ſeeds in each, which ripen in Auguſt and September.

The white vetch is rather the more ſucculent plant of the two, and therefore it is beſt for fodder: but many are unwilling to cultivate this ſort, becauſe their ſeeds, being white, are much ſooner diſcovered by rooks and other birds, than thoſe of the black, which bear a nearer reſemblance to the colour of the ground. This objection may, however, be eaſily removed, by ſowing them in drills, and then covering them carefully, inſtead of the uſual method of ſcattering them with a broad-caſt, and plowing them in lightly.

The ſmall black-ſeeded vetch, which ſome call rathripe, and others pebble, goar, or ſummer vetch, is much tenderer than either of the former, and therefore leſs cultivated. This muſt always be ſown in the ſpring: whereas the others may be ſown in ſpring or autumn.

But another ſpecies of vetch, viz. the Siberian, hardly known, to the generality of farmers in this country, bids fair to become, perhaps, the moſt uſeful of all for fodder; for its ſtalks grow to a great length, and are well furniſhed with leaves, which do not decay in autumn, like thoſe of the other ſorts, but continue green all the winter, in defiance of the hardeſt froſt: ſo that in February and March when there often is a ſcarcity of green fodder for ewes and lambs, this may be of ſingular ſervice, eſpecially if theſe

theſe plants are ſupported from trailing upon the ground. Their flowers, which appear in July, are of a light blue colour.

This, like our common vetch, may be ſown in the ſpring, or in autumn; and when the plants are come up, they will not require any other culture than keeping them clear from weeds; a work which, if the ſeeds are ſown thin in rows four feet aſunder, as Mr. Miller rightly adviſes, may be eaſily done with the Dutch hoe, while they are young, and afterwards with the hoeing plough. By this thin ſowing, the ſtalks of theſe vetches, which ſend out many branches, and extend very far, will be kept from matting ſo cloſely together as to rot each other by excluding the air; and by earthing up their ſtems in the ſame manner as ſhould be done for peas and beans, they will be greatly ſtrengthened, their leaves will grow the larger and more ſucculent, and they will conſequently yield an encreaſed quantity of fodder. The repeating of this as often as it may be found neceſſary to deſtroy the weeds in ſummer, which may be done at a very ſmall expence, and is particularly proper when the growth is intended for the green food of cattle, will be attended with the farther important advantage of preparing the ground thoroughly for whatever other crop may afterwards be put upon it.

As the plants of this kind of vetch will not be in danger of being hurt by froſt, they ſhould not be cut till the ſpring, when the beſt way will be to take them as they may be wanted, green, for the feeding of ewes: but ſome of them ſhould be left untouched, for ſeeds: for if thoſe which are cut do ſhoot out again, they will flower ſo late in ſummer, that their ſeeds will not ripen, unleſs the autumn proves very warm. A better way will therefore be to ſow a proper quantity of ſeeds for this purpoſe in a ſeparate ſpot of ground: becauſe, when the other is cut, the ground may be plowed for other crops; and if the ſeaſons ſhould be ſo mild as to produce a ſufficiency of green food independent of this, the vetches may be plowed into the ground, to which they will be an excellent dreſſing for other crops.

Mr. Miller, who has a high opinion of this ſort of vetch, and whoſe recommendation of it ought to have very great weight, is now beginning to try it in the field, where he has not yet had experience of its culture; but the experiments which he has made with it for ſix years paſt, on ſmall patches of it ſown in gardens, in different ſituations, have fully anſwered his expectation: for he has found theſe plants continue in great verdure in all thoſe places, when moſt of the perennial plants in the ſame ſituation have ſuffered greatly by the froſt, and could have cut from only eight of them as much fodder as would have been equivalent to half a truſs of clover.

Some years ago I had a few ſeeds of Mr. Miller of the Siberian vetch, and ſowed them in a garden, againſt a ſouth wall; they came up weak, and ſlender, and I found required to be ſupported. They run up pretty high, and the ſecond year advanced to about five feet, and produced ſome ſeed. But they had very few leaves on their ſtems, and thoſe which came out near their tops, were thin and dry; the ſtems and branches were alſo dry and wiry; ſo that I had no opinion of them for fodder to cattle, eſpecially as they wanted to be ſupported; and therefore did not proceed in the culture of them: perhaps they were in an improper ſituation.

Vetches are generally ſown either in autumn, or early in the ſpring: but the beſt time, in this country, is toward the beginning of Auguſt; becauſe the rains which uſually fall about that ſeaſon will bring them up in a ſhort time, and the plants will get ſtrength before winter, and be fit to cut for the food of cattle early in the ſpring, when green fodder is moſt wanted: and if they are deſigned for ſeed only, theſe early ſown vetches will come early into flower, and their ſeeds will ripen early, ſo that they may be cut and ſtacked in good weather, which is a great advantage; for thoſe which ripen late, are often ſtacked or houſed wet, and then their ſeeds frequently ſprout in the mow, and are ſpoiled.

Vetches will do well in almoſt any ground; not excepting even ſuch as can ſcarcely produce any other plant. The common method of ſowing them is in broad-caſt, ploughing them lightly in, as was obſerved before; and the uſual allowance is two buſhels of ſeed for an acre of land, though ſome ſow two buſhels and an half. Either of theſe practices may do well enough for thoſe vetches which are intended to be cut for fodder in the ſpring; but when they are ſown with a deſign to let them ſtand for ſeed, it will certainly be much better to ſow them in drills, in the ſame manner as is practiſed for peaſe; and in this caſe leſs than half of the above-mentioned quantity of ſeed will be ſufficient: for the rows ſhould be at leaſt three feet aſunder, that the hoe-plough may have room to go between them, to deſtroy the weeds, and earth up the plants, which, when thus managed, will produce a much greater crop, and ripen better and earlier, than in the common way. Theſe drills ſhould be of about the ſame depth as for peaſe, and the ſeeds ſhould be ſcattered at about the ſame diſtance in the drills, in which they ſhould be carefully covered over as ſoon as they are ſown; for otherwiſe the rooks will diſcover them; and when thoſe voracious creatures once find the rows, they will ſpeedily deſtroy them entirely, if they are not carefully watched. The preventing of this is another advantage which attends the ſowing of vetches early in autumn, rather than in the ſpring: becauſe there is more food for rooks and pigeons in the open field in the former of theſe ſeaſons, and the plants will then appear much ſooner above ground. Toward the end of October, by which time the plants will have acquired conſiderable ſtrength, the horſe-hoe ſhould begin to work between the rows, provided the weather be dry: and in doing this, particular care ſhould be taken to lay the earth up as high to the ſtems of the plants as can poſſibly be, without covering their tops. This will help to ſecure them againſt froſt, and clear the ground of weeds at leaſt till March, when the plants ſhould be earthed up a ſecond time, and the intermediate ſpaces between their rows be cleaned again, in the ſame manner as before. This will make them grow ſo vigorouſly, that they will meet and cover thoſe ſpaces in a little time: whereas thoſe ſown in the ſpring will not grow to half this ſize, and will be very late in flowering.

When vetches are intended only for fodder, of which they generally afford two good crops in the year, in hot countries, or when the farmer deſigns them for ploughing in, by way of manure, they need not be ſown in drills, or huſbanded in the manner directed: the common broad-caſt way will then do well enough: but ſtill it is moſt adviſable, in either caſe, to ſow them early in autumn; becauſe, in the firſt place, they will produce the deſired green fodder much earlier in the ſpring; and in the ſecond, they will be fit to plough in much ſooner the following year, and thereby have time properly to meliorate

the land, and prepare it to receive the enſuing crop, which they are generally allowed to do even more effectually than peaſe. Stiff clays are peculiarly benefitted by this dreſſing: but it ſurely is bad huſbandry to ſow vetches for green fodder, where lucerne will thrive; becauſe this laſt will yield greater plenty of ſtill more nouriſhing food.

In ſome countries, eſpecially abroad, they mix oats with their tares or vetches, an equal quantity of each, and ſow them in February. The vetch, ſupported in ſome meaſure by the oat, grows the higher for it: and, about the middle of May, this mixture is mowed, and given to horſes and other cattle, which it fattens greatly. Mr. Mortimer likewiſe thinks it a good way to ſow horſe-beans and tares together: their ſeeds are eaſily parted with a riddle: and another obſervation in which he agrees with the Maiſons Ruſtiques, is, that more vetches ſhould not be ſown at any one time, than can be covered the ſame day, becauſe the dew is apt to ſpoil them: conſequently they ſhould not be ſown till two or three hours after the riſing of the ſun; by which time the moiſture will be exhaled from off the ſurface of the earth. But though their ſeeds cannot bear dampneſs, which would ſoon rot them, their plants, eſpecially in ſandy land, often periſh in dry years, for want of water. To make them flouriſh well, they require a ſhower of rain every ten or twelve days. One ploughing to turn in the ſtubble of the preceding crop, and another at the time of ſowing, are ſufficient for this plant: but thoſe who give only one ploughing, which is when they ſow, and afterwards harrow in the ſeed, neither have, nor can expect, an equally good return.

When vetches are cultivated for their ſeeds, they ſhould be cut ſoon after the pods turn brown, and ſtacked as ſoon as they are dry: for if they are ſuffered to lie out in the field, till they receive wet, and there then comes a hot day, moſt of the pods will burſt, unleſs they happen to have been blighted; in which caſe they will not open ſo eaſily. Their haulm, when dry, and threſhed, is eſteemed good food for cattle, and ſome ſay that their ſeeds are as good for horſes, as beans; which, if true, ſhould render them the more valuable, becauſe theſe will grow on the lighteſt ſandy land, where beans will not thrive; and may therefore, as Mr. Miller obſerves, be a good improvement to ſome counties in England, where they do not even attempt to cultivate the bean. About three loads from an acre are reckoned a good crop.

Vetches, when threſhed out, will be as good for ſowing at the end of five or ſix years, as at firſt, if care be taken to turn them in the heap from time to time. Mr. Mortimer cautions the huſbandman to lay them by themſelves in ſome convenient place, ſeparate from his other corn, becauſe they will otherwiſe be apt to foul it.

It is commonly ſaid, that the farmer cannot ſow any thing more profitable than vetches; for that, beſides enriching the land, a load of them will go farther than two loads of hay: but Mr. Liſle has a calculation tending to prove, that an acre of broad clover is worth twenty ſhillings a year more than an acre of any vetches, and that the clover ſhould therefore be preferred, wherever the ground will bear it well.

"It would certainly, ſays Mr. J. Smith, an ingenious farmer of Eſſex, be of great national advantage, could our ſtock of cattle and ſheep be encreaſed without diminiſhing the quantity of our lands that are in tillage.

"This can no otherways be done, but by encouraging the growth of artificial paſtures, which the farmers have of late years fallen into.

"The turnip huſbandry is not of very old ſtanding in this iſland, yet has it made a very rapid progreſs. The immenſe utility of it, when properly practiſed, cannot but be evident, even to an ignorant common farmer, on the ſlighteſt inſpection. This evident utility of it has occaſioned its being almoſt univerſally practiſed in the counties of Norfolk, Suffolk, and Eſſex, whence it has ſpread to other parts of England, and is of late even adopted in Ireland, where, I am informed, the gentry are very intent on improving their eſtates.

"The coleſeed plant has alſo its utility, and in many places is as univerſally ſown as the turnip. I have, myſelf, very often raiſed this crop, as well for feeding ſheep, &c. as for the ſake of its ſeed, and have had no little ſucceſs in this huſbandry, being very fond of it, as coleſeed is an excellent crop to over-power, choak, and deſtroy weeds.

"I wiſh the burnet graſs, ſo ſtrongly recommended, may anſwer every purpoſe that is expected from it: it ſeems to promiſe very fair from the accounts given of it by Mr. Rocque; and, if it has not too much prejudice to encounter withal, it may probably ſucceed, and the culture of it become as univerſally adopted, as is that of the turnip, or coleſeed plant, already mentioned.

"So much in general; but the particular reaſon of my now writing to you, was to recommend to the induſtrious farmer the cultivation of vetches as food for cattle.

"I have often ſown this crop with great ſucceſs, to prepare my land for wheat, and have always found that by growing to a large cover they deſtroy and choak up a great number of weeds, which would otherwiſe do me immenſe damage: indeed, I think them, for this purpoſe next in rank to a hoeing crop.

"When I ſow vetches before wheat, I always, in the ſpending my crop, have regard to the condition of my land. If my land is not in good heart, but wants mending, I not unfrequently fold my ſheep on it, and feed off my crop in the field; but if it is inclined to be rank, or the wheat which is ſowed on it, is apt to run much to ſtraw, I often cut my vetches green, and feed my horſes in the ſtable with them. I find no food agree better with them; they thrive well, grow fat, and are always in good health and ſpirits when thus fed.

"I ſometimes alſo mow my vetches when they are in bloom, and make them into hay, in the ſame manner I manage my clover and meadow graſs; all which I leave in graſs cocks in the field, whilſt it is haying, very ſeldom ſpreading it, for fear of rain; and after two or three turns it is generally fit to carry.

"The great art, in making hay of vetches, is to contrive in ſuch ſort, that the leaves do not drop off the plants, which, if left too long, or dried too ſuddenly, they are apt to do; and the farmer is to underſtand, that great part of the peculiarly nouriſhing quality of the hay reſides in the leaf.

"I ſay peculiarly nouriſhing, becauſe almoſt every kind of cattle, as horſes, oxen, cows, and ſheep, are fond of it, and they all thrive on this food amazingly: this I have often experienced, and moreover obſerved, that they make no waſte even of the ſtalks, which they eat with an appetite.

"In

" In this manner I manage for my hay, when I am inclined to have it very fine and fit for my cows and ſheep; and in this manner it is no difficult matter to get it in good order, ſweet, and wholeſome: but when I intend it only for my horſes, I generally let my crop ſtand ſomething longer; that is, till the kid, or pod, is formed, and the ſeed about half grown within it.

" When the hay is made in the laſt way, the buſineſs is much more tickliſh, and conſtant obſervation muſt be made to ſee when the crop is in proper order to cut, becauſe if it is left too long, the ſtalks grow hard and ſticky, and the leaves are apt to drop off.

" This hay is more nouriſhing, when cut in this laſt method, than I can well deſcribe: it anſwers both for hay and corn; and with this food my horſes will be in good fleſh, health, and ſpirit, and be able to do a great deal of work. I have often proved this to be true, and can therefore the better venture to aſſert it.

" I have ſtill another method of making theſe vetches into hay, which is to leave the crop, till the ſeed is grown to its full ſize in the pod, though not ripe: I then mow them, and, when dry, threſh them on a cloth in the field; by which means I procure a conſiderable quantity of pigeons meat, which fetches me a tolerable good price; and this pigeons meat ſells better at market, than if the vetches had ſtood till the ſeed was thoroughly ripe: for by cutting the crop when the ſeeds are barely full grown before they begin to harden, they ſhrink in the drying, and thereby become of a ſmaller ſize than they are by nature, and conſequently more proper food for pigeons than if they were larger.

" I own, the hay in this laſt method is not quite ſo good, as many of the leaves will, in ſpite of all the care that can be taken, drop off, and the ſtalks will be a little ſticky: yet, after all, it ſerves very well for my ordinary cattle, and even for my plow and cart horſes, with the aſſiſtance of a few oats.

" Vetches are a very good plant to ſow thick on land, and when they have formed a perfect cover, to plow them in, in order to the land's being ſown afterwards with wheat on one plowing. In this intention they anſwer to the full as well as buck-wheat, or clover.

" When a farmer intends to plow in his vetches, I would by all means adviſe him to do it ſome weeks before he ſows his wheat, that they may have time to ferment and rot, or the conſequences may be fatal to this crop: I once, myſelf, loſt the chief part of a fine field of wheat by this overſight." *Muſeum Ruſticum, vol.* II. *p.* 169.

" Vetches, ſays a gentleman farmer of Surry, are a grain often overlooked by the farmer; yet are they, when properly cultivated and applied to proper uſes, highly valuable, and very beneficial.

" They are a very hardy grain, and reſiſt the ſeverity of a ſevere winter better than moſt other crops; beſides which, they have the additional advantage of growing in almoſt any ſoil; but then the farmer is to expect a produce in proportion to the goodneſs of his land.

" I would by all means adviſe, where it is intended for early feed, or to ſtand for ſeed, that the ſmall winter vetch be cultivated in preference to every other ſort, becauſe it is not only hardier, but alſo, being ſown about Michaelmas, it is forwarder, to ſerve as fodder, or will be earlier ready to mow for ſeed, which is no inconſiderable advantage; for the vetch being a ſucculent plant, and forming a very thick cover on the land where it is a full crop, it will be in danger of rotting inſtead of drying, if it ſhould be cut late, or the harveſt weather ſhould be very rainy; but if the winter vetch is ſown early, it will, in general, be fit to mow in July, or the very beginning of Auguſt, when there is leſs danger.

" Few farmers allow more than one ploughing for vetches: I always allow two, notwithſtanding what the neighbouring farmers tell me of turning the freſh ſoil again down to the bottom of the furrow: I find my advantage in this practice, and ſhall therefore continue it.

" I have generally experienced the firſt week in October, if the weather is fine, to be the very beſt time for ſowing vetches; and I allow only two buſhels of good ſeed to every acre, which I find full ſufficient.

" I ſow them broad-caſt on the rough land, as the plough leaves it after the ſecond ploughing, taking care to harrow the field length-ways and croſs-ways, in order to cover the ſeed the better; after which I paſs over it a roller, heavier or lighter, according to the nature of ſoil and the dryneſs of the weather, obſerving, that if the weather is dry, and the ſoil light, I uſe a heavy roller, in order to cloſe the pores of the light earth; but if the ſoil is ſtiff, and the weather damp, I uſe a lighter roller, leſt I ſhould knead and cruſt the field over, ſo as to ſtop the young ſhoot of the vetch.

" This crop will, in general, choak all the weeds that come up with it; but this muſt, however, be underſtood of the ſmaller ſorts, for if there are many large rampant weeds, it will be neceſſary to have them extirpated with the hook.

" Vetches afford excellent food for ſheep in the ſpring, make cows give a great deal of good milk, and horſes are fonder of them, cut green, than almoſt any other food.

" The beſt way is to cut them freſh and freſh every morning as they are wanted; and if the farmer has occaſion for them for this uſe only, he may ſow in the ſpring, to great advantage, the large vetch, at different times; by which means he will have a ſucceſſion of crops, which, to give green to his cattle, he ſhould always cut juſt before the plant flowers, for it is then in its tendereſt and moſt ſucculent ſtate, and will afford moſt nouriſhment; whereas, if he leaves it till the ſeeds are nearly ripe, the ſtalks harden, grow ſticky, and are of far leſs value; beſides that many of the lower leaves will, by this time, be withered, or dropped off, and entirely loſt.

" I muſt not conclude without mentioning an important uſe to which vetches are often applied; I mean, a full crop of them is frequently ploughed into the land as manure, to prepare it for a ſucceeding crop of wheat.

" When vetches are ſown with this intention, I would recommend the large ſort, and that four buſhels of good ſeed ſhould be uſed, to be ſown broad-caſt twice in a place: but my way of ſowing it is ſomewhat peculiar when I mean to plough it in; therefore I think it may not be amiſs to relate it.

" Moſt farmers ſow it by caſting it twice in a place, immediately after the land is ploughed, and then harrow and roll the field; but I proceed as follows.

" As ſoon as the field is plowed, I ſow two buſhels, broad-caſt, on every acre; after which I harrow it length-ways and croſs-ways. When this is done, I ſow the remaining two buſhels, and then harrow it twice again with a pair of heavier harrows, and finally ſcratch it twice over with light harrows to raiſe a mould, concluding my work by paſſing a roller over the whole

field. By this management I ſcarcely ever miſs of a full corp, which covers the whole land, choaks the weeds, and ſerves as excellent manure for the wheat that is to follow.

"I have always found that this huſbandry ſucceeded beſt in light, hungry, ſandy, or gravelly loams; and a brother of mine, who lives in Bedfordſhire, tells me it does very well on a chalky ſoil, provided there is any heart in it.

"The time I chooſe to plough in the vetches is juſt after the bloſſom fades, and the kid begins to form; and it is really ſurpriſing to ſee what a ſtrong fermentation they raiſe in the ſoil.

"I have ſometimes had my crops ſo heavy that I have been obliged to mow, or hook up, the vetches before I could plough the land: but this is not often the caſe; when it is, the farmer has reaſon to rejoice.

"There are, as I hinted in the beginning of this account, ſcarcely any ſoils but the vetch will thrive in, though ever ſo various in their nature. I am an old man, and in the courſe of many years experience have ſown vetches often on a ſandy and gravelly loam, a chalk, though not for ploughing-in, a gravel, a low damp clay, and a perfect brown loam. On all theſe varieties of ſoil have they ſucceeded with me; but I muſt note, that the farmer may expect a larger crop from a gravel (I do not mean a pure gravel) that has ſome heart and ſtrength in it, than from the fineſt loam, which has been, by a long-continued courſe of bad culture, ſtarved and impoveriſhed.

"The large vetch may be ſown in January, February, March, April, or even the beginning of May, when deſigned for green fodder; but I would, by all means, have the induſtrious farmer avoid ſowing it before Chriſtmas, for it is a tender plant, and if hard froſt enſue, he may chance to loſe his crop." *Muſeum Ruſticum, vol.* III. *page* 185.

VINEGAR, an acid penetrating liquor, prepared from wine, cyder, beer, &c. of conſiderable uſe both as a medicine and ſauce.

The proceſs of turning vegetable matters to vinegar, is thus delivered by Dr. Shaw: take the ſkins of raiſins, after they have been uſed in making wine; and pour three or four times their own quantity of boiling water upon them, ſo as to make a thin aqueous mixture. Then ſet the containing caſk, looſely covered, in a warmer place than is uſed for vinous fermentation; and the liquor in a few weeks time will become a clear and ſound vinegar; which being drawn off from its ſediment, and preſerved in another caſk, well ſtopped down, will continue perfect, and fit for uſe.

This experiment ſhews us a cheap and ready way of making vinegar from refuſe materials; ſuch as huſks of graſſes, decayed raiſins, the leees of wine, grounds of ale, beer, &c. which are frequently thrown away as uſeleſs. Thus, in many wine countries, the marc, rape, or dry preſſing of grapes, are thrown in heaps, and ſuffered to putrefy unregarded, though capable of affording as good vinegar as the wine itſelf. In ſome places they bury copper-plates in theſe huſks, in order to make verdigreaſe; but this practice ſeems chiefly confined to the ſouthern parts of France. Our preſent experiment ſhews us how to convert them to another uſe; and the direction extends to all the matters that have once undergone, or are fit to undergo, a vinous fermentation, for that all ſuch matters will afford vinegar. Thus all our ſummer-fruits in England, even black-berries; all the refuſe waſhings of a ſugar-houſe, cyder-preſſings, or the like, will make vinegar, by means of water, the open air, and warmth.

The whole proceſs, whereby this change is effected, deſerves to be attentively conſidered; and, firſt, the liquor to be thus changed, being kept warmer than in vinous fermentation, it begins, in a few days, to grow thick or turbid; and without throwing up bubbles, or making any conſiderable tumult, as happens in vinous fermentation, depoſits a copious ſediment.

The effect of this ſeparation begins to appear, firſt, on the ſurface of the liquor, which gathers a white ſkin that daily encreaſes in thickneſs, till at length it becomes like leather; and now, if continued longer in this ſtate, the ſkin turns blue, or green, and would at laſt grow ſolid, and putrefy: therefore, in keeping down this ſkin as it grows, and thruſting it gently down to the bottom of the veſſel, conſiſts much of the art of vinegar making, eſpecally from malt. For the difference between vinous and acetous fermentation, *See the article* FERMENTATION.

Method of making Cyder VINEGAR. The cyder (the meaneſt of which will ſerve the purpoſe) is firſt to be drawn off fine into another veſſel, and a quantity of the muſt, or pouz of apples, to be added: the whole is ſet in the ſun, if there be a conveniency for the purpoſe: and, at a week or nine days end, it may be drawn off. *See* CYDER.

Method of making Beer-VINEGAR. Take a middling ſort of beer, indifferently well hopped; into which, when it was worked well, and is grown fine, put ſome rape, or huſks of grapes, uſually brought home for that purpoſe: maſh them together in a tub; then, letting the rape ſettle, draw off the liquid part, put it into a caſk, and ſet it in the ſun as hot as may be (the bung being only covered with a tile, or ſlate-ſtone) and in about thirty or forty days, it will become a good vinegar, and may paſs into uſe as well as that made of wine, if it be refined, and kept from turning muſty.

Or thus: to every gallon of ſpring-water add three pounds of Malaga-raiſins; which put into an earthen jar and place them where they may have the hotteſt ſun from May till Michaelmas; then preſſing all well, tun the liquor up in a very ſtrong iron-hooped veſſel, to prevent its burſting: it will appear very thick and muddy, when newly preſſed; but will refine in the veſſel, and be as clear as wine.

Thus let it remain untouched for three months, before it be drawn off, and it will prove excellent vinegar.

Method of making Wine-VINEGAR. Any ſort of vinous liquor, being mixed with its own fæces, flowers, or ferment, and its tartar, firſt reduced to powder: or elſe with the acid and auſtere ſtalks of the vegetable from whence the wine was obtained, which hold a large proportion of tartar: and the whole being kept frequently ſtirring in a veſſel which has formerly held vinegar, or ſet in a warm place full of the ſteams of the ſame, will begin to ferment a-new, conceive heat, grow ſour by degrees, and ſoon turn into vinegar.

The remote ſubjects of acetous fermentation are the ſame with thoſe of vinous; but the immediate ſubjects of it are all kinds of vegetable juices, after they have once undergone that fermentation which reduces them to wine: for it is abſolutely impoſſible to make vinegar of muſt, the crude

crude juice of grapes, or other ripe fruits, without the previous aſſiſtance of vinous fermentation.

The proper ferments for this operation, whereby vinegar is prepared, are, 1. The fæces of all acid wines. 2. The lees of vinegar. 3. Pulveriſed tartar; eſpecially that of Rheniſh wine, or the cream, or cryſtals thereof. 4. Vinegar itſelf. 5. A wooden veſſel well drenched with vinegar, or one that has been long employed to contain it. 6. Wine that has often been mixed with its own fæces. 7. The twigs of vines, and the ſtalks of grapes, currants, cherries, and other vegetables of an acid auſtere taſte. 8. Bakers leaven, after it is turned acid. 9. All mannner of ferments, compounded of thoſe already mentioned.

The French uſe a method of making vinegar different from that above deſcribed. They take two large oaken veſſels, the larger the better, open at top; in each whereof they place a wooden grate, within a foot of the bottom; upon theſe grates they firſt lay twigs, or cuttings of vines, and afterwards the ſtalks of the bunches, without the grapes themſelves, or their ſtones; till the whole pile reaches within a foot of the brim of the veſſels: then they fill one of theſe veſſels with wine to the very top, and half fill the other; and with liquor drawn out of the full veſſel, fill up that which was only half full before; daily repeating the ſame operation, and pouring the liquor back from one veſſel into another; ſo that each of them is full, and half full, by turns.

When this proceſs has been continued for two or three days, a degree of heat will ariſe in the veſſel, which is then but half full, and increaſe for ſeveral days ſucceſſively, without any appearance of the like in the veſſel which happens to be full, during thoſe days; the liquor whereof will ſtill remain cool; and as ſoon as the heat ceaſes in the veſſel that is half full, the vinegar is prepared: which, in the ſummer, happens on the fourteenth or fifteenth day from the beginning; but in the winter, the fermentation proceeds much ſlower: ſo that they are obliged to forward it by artificial warmth, or the uſe of ſtoves.

When the weather is exceeding hot, the liquor ought to be poured off from the full veſſel into the other twice a-day: otherwiſe, the liquor will be over-heated, and the fermentation prove too ſtrong; whence the ſpirituous parts will fly away, and leave a vapid wine, inſtead of a vinegar, behind.

The full veſſel is always to be left open at the top, but the mouth of the other muſt be cloſed with a cover of wood, in order the better to keep down and fix the ſpirit in the body of the liquor; otherwiſe, it might eaſily fly off in the heat of fermentation. The veſſel that is only half full ſeems to grow hot, rather than the other, becauſe it contains a much greater quantity of the vine-twigs and ſtalks, than that, in proportion to the liquor; above which the pile, riſing to a conſiderable height, conceives heat the more, and ſo conveys it to the wine below.

Vinegar is a medicine of excellent uſe in all kinds of inflammatory and putrid diſorders, either internal or external: in ardent bilious fevers, peſtilential and other malignant diſtempers, it is recommended by Boerhaave as one of the moſt certain ſudorifics. Weakneſs, fainting, vomiting, hyſterical and hypocondriacal complaints have alſo been frequently relieved by vinegar applied to the mouth or noſe, or received into the ſtomach. Diſtilled vinegar has the ſame virtues, only in a ſtronger degree.

There are alſo medicated vinegars, as vinegar of antimony, of elder, litharge, roſes, ſquills, treacle, &c. which derive their chief virtues from the vinegar.

VIPER, the name of a well known ſerpent, common in many parts of England.

The bathing the part bit by a viper with olive oil, is ſaid to effectually prevent the fatal conſequences, that would otherwiſe attend it.

VIVES, a diſeaſe in horſes, which differs from the ſtrangles only in this, that the ſwellings of the kernels under the ears of the horſe (which are the parts at firſt chiefly affected) ſeldom gather, or come to matter, but by degrees perſpire off, and diſperſe, by warm cloathing, anointing with the marſhmallow ointment, and a moderate bleeding or two. But ſhould the inflammation continue, notwithſtanding theſe means, a ſuppuration muſt be promoted by the methods recommended in the ſtrangles. *See the article* STRANGLES.

When theſe ſwellings appear in an old or full-aged horſe, they are ſigns of great malignity, and often of an inward decay, as well as forerunners of the glanders.

The mercurial ointment mentioned in the article STRANGLES may be prepared thus:

> Take of crude mercury, or quickſilver, one ounce; Venice-turpentine half an ounce; rub together in a mortar till the globules of the quickſilver are no longer viſible; then add two ounces of hogslard.

Some authors recommend this ointment to be uſed at firſt, in order to diſperſe the ſwellings, and prevent their coming to matter; bleeding and purging at the ſame time for that purpoſe; but as in young horſes they ſeem to be critical, the practice by ſuppuration is certainly more eligible and ſafe; for want of properly affecting which, the humours frequently ſettle, or are tranſlated to the lungs, and other bowels; or falling on the fleſhy parts of the hind quarters, form deep impoſtumes between the muſcles, which diſcharge ſuch large quantities of matter, as ſometimes kill the horſe, and very often endanger his life. *Bartlet's Farriery, page* 99.

ULCER, a ſolution of the ſoft part of an animal body, together with the ſkin.

The firſt intention in the cure of ulcers is bringing them to digeſt, or diſcharge a thick matter; which will in general be effected by the green ointment, or that with precipitate, but ſhould the ſore not digeſt kindly by theſe means, but diſcharge a gleety thin matter, and look pale, you muſt then have recourſe to warmer dreſſings, ſuch as balſam, or oil of turpentine, melted down with your common digeſtive, and the ſtrong beer poultice over them; it is proper alſo in theſe kinds of ſores where the circulation is languid, and the natural heat abated, to warm the part, and quicken the motion of the blood, by fomenting it well at the time of dreſſing; which method will thicken the matter, and rouſe the native heat of the part, and then the former dreſſings may be re-applied.

If the lips of the ulcer grow hard or callous, they muſt be pared down with a knife, and afterwards rubbed with the cauſtic.

Where ſoft fungous fleſh begins to riſe, it ſhould carefully be ſuppreſſed in time, otherwiſe the cure will go on but ſlowly; if it has already ſprouted above the ſurface, pare it down with a knife, and rub the remainder with a bit of cauſtic; and to prevent its riſing again, ſprinkle the

fore with equal parts of burnt allum, and red precipitate; or waſh with the ſublimate water, and dreſs with dry lint even to the ſurface, and then roll over a compreſs of linnen as tight as can be borne; for a proper degree of preſſure, with mild applications, will always oblige theſe ſpongy excreſſences to ſubſide, but without bandage the ſtrongeſt will not ſo well ſucceed.

All ſinuſſes, or cavities, ſhould be laid open as ſoon as diſcovered, after bandages have been ineffectually tried; but where the cavity penetrates deep into the muſcles, and a counter opening is impracticable or hazardous; where by a continuance, the integuments of the muſcles are conſtantly dripping and melting down; in theſe caſes injections may be uſed, and will frequently be attended with ſucceſs. A decoction of colcothar boiled in forge-water, or ſolution of lapis medicamentoſus in lime-water, with a fifth part of honey and tincture of myrrh, may be firſt tried, injecting three or four ounces twice a day, or ſome reſin melted down with oil of turpentine may be uſed for this purpoſe: if theſe ſhould not ſucceed, the following, which is of a ſharp and cauſtic nature, as recommended on Mr. Gibſon's experience.

Take of Roman vitriol half an ounce, diſſolve in a pint of water, then decant and pour off gently into a large quart bottle; add half a pint of camphorated ſpirit of wine, the ſame quantity of the beſt vinegar, and two ounces of Ægyptiacum.

This mixture is alſo very ſucceſsfully applied to ulcerated greaſy heels, which it will both cleanſe and dry up.

Theſe ſinuſſes, or cavities frequently degenerate into fiſtulæ, that is, grow pipey, having the inſide thickened, and lined as it were with a horny callous ſubſtance. In order to their cure, they muſt be laid open, and the hard ſubſtance all cut away; where this is impracticable, ſcarify them well, and truſt to the precipitate medicine made ſtrong, rubbing now and then with cauſtic, butter of antimony, or equal parts of quickſilver and aqua-fortis.

When a rotten or foul bone is an attendant on an ulcer, the fleſh is generally looſe and flabby, the diſcharge oily, thin, and ſtinking, and the bone diſcovered to be carious, by its feeling rough to the probe paſſed through the fleſh for that purpoſe. In order to a cure, the bone muſt be laid bare, that the rotten part of it be removed; for which purpoſe, deſtroy the looſe fleſh, and dreſs with dry lint; or the doſſils may be preſſed out of tincture of myrrh or euphorbium: the throwing off the ſcale is generally a work of nature, which is effected in more or leſs time, and in proportion to the depth the bone is affected, tho' burning the foul bone is thought by ſome to haſten its ſeparation.

Where the cure does not properly ſucceed, mercurial phyſic ſhould be given, and repeated at proper intervals and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime-waters, are proper for that purpoſe. *Bartlet's Farriery, page* 253.

ULIGINOUS, an appellation given to a moiſt, mooriſh and fenny ſoil.

UMBEL, the extremity of a ſtalk or branch of a plant, divided into ſeveral peduncles, or rays, beginning from the ſame point, and opening in ſuch a manner, as to form an inverted cone.

UMBELLIFEROUS *Plants*, thoſe whoſe flowers are produced in an umbel, on the top of the ſtalks, ſomewhat reſembling an umbrella. Of this kind are the fennel, parſley, parſnip, carrot, hemlock, &c.

UNDERWOOD, coppice, or any wood not accounted timber. *See the article* COPPICE.

VOOR, fallow land. *See the article* FALLOW.

URE, the udder of a cow, ſheep, &c.

URITH, etherings, or windings of hedges.

URRY, a ſort of blue or black clay, lying near a vein of coal.

URINE, a ſerous and ſaline matter ſeparated from the blood of animals, and emitted by the canal of the urethra.

It is of excellent uſe as a manure, when deprived of its hot fiery particles by time, which will ſo alter its nature as to render it an extraordinary fertilizer of every kind of ſoil. Columella certifies that old urine is excellent for the roots of trees. Mr. Hartlib commends the Dutch for preſerving the urine of cows as carefully as they do the dung, to enrich their lands; and inſtances a woman he knew near Canterbury, who ſaved in a pail all the urine ſhe could, and when the pail was full, ſprinkled it on her meadow, the graſs of which looked yellow at firſt, but afterwards grew ſurpriſingly. Similar to this is what Mr. Bradley relates, as of his own knowledge. Human urine was thrown into a little pit conſtantly every day, for three or four years. Two years after, ſome earth was taken out of this pit, and mixed with twice as much other earth, to fill up a hollow place in a graſs walk. The turf which was laid upon this ſpot grew ſo largely and vigorouſly, beſides being much greener than the reſt, that, by the beſt computation he could make, its graſs, in a month's time, was above four times as much in quantity as that of any other ſpot of the ſame ſize, though the whole walk was laid on very rich ground. The author of the Engliſh Improver is therefore very right in ſaying that human urine is of greater worth, and will fatten land more than is generally imagined by our farmers, whom he adviſes, to take all opportunities of preſerving this, and every ſort of urine, for their ground, as carefully as is done in Holland.

USTILAGO, the ſame with burnt grain. *See the article* BURNT-GRAIN.

UTENSIL, a domeſtic moveable of any kind.

W.

WAD, black lead.

WAGGON, a vehicle or carriage, of which there are various forms, accommodated to the different uſes they are intended for. *See the article* WHEEL.

WAIF, an eſtray, which, for want of the owner's appearance after it has been cried and publiſhed in the neighbouring markets, is forfeited to the lord of the manor.

WALK, among horſemen, is the ſloweſt, and leaſt raiſed of all a horſe's goings. It is performed by a horſe's lifting up his two legs on a ſide, the one after the other, beginning with the hind leg firſt. Thus, if he leads with the legs of the right ſide, then the firſt foot he lifts is the far hind-foot, and in the time he is ſetting it down, (which in a ſtep is always ſhort of the tread of his fore-foot on the ſame ſide) he lifts his far fore-foot, and ſets it down before his near fore-foot. Again, juſt as he is ſetting down his far fore-foot, he lifts up his near fore-foot, and ſets it down again juſt ſhort of his near fore-foot; and juſt as he is ſetting it down, he lifts his near fore-foot, and ſets it down beyond his far fore-foot.

WALL, the principal part of a building, as ſerving both to incloſe it, and ſupport the roof, floors, &c.

Walls are diſtinguiſhed into various kinds, from the matter whereof they conſiſt, as plaſtered or mud-walls, brick-walls, ſtone-walls, flint, or boulder-walls, and boarded-walls. In all which theſe general rules are to be regarded. 1. That the right angle therein depending is the true cauſe of all ſtability, both in artificial and natural poſition. 2. That the maſſieſt and heavieſt materials be the loweſt, as fitter to bear than to be borne. 3. That the walls, as they riſe, diminiſh proportionably in thickneſs, for eaſe both of weight and expence. 4. That certain courſes or ledges, of more ſtrength than the reſt, be interlaid, like bones, to ſtrengthen the whole fabric.

Brick-walls are the moſt important and uſual amongſt us. In theſe, particular care is to be taken about laying of the bricks; that in ſummer they be laid as wet, and in winter as dry, as poſſile, to make them bind the better with the mortar: that in ſummer, as faſt as they are laid, they be covered up, to prevent the mortar, &c. from drying too faſt: that in winter they be covered well to protect them from rain, ſnow, and froſt, which are all enemies to mortar: that they be laid joint on joint in the middle of the walls as ſeldom as may be: but that good bond be made there as well as on the outſide. Care is to be taken that the angles be firmly bound, which are the nerves of the whole edifice. In order to which, in working up the walls of a building, it is not adviſable to raiſe any wall above eight feet high, before the next addjoining wall be brought up to it, that ſo good bond may be made in the progreſs of the work; it may be worth notice, that a wall a brick and a half thick, with the joint, will be in thickneſs fourteen inches or very near; whereas one hundred and fifty or one hundred and ſixty bricks will lay a yard ſquare meaſured upon the face of the building; and to the ſquare of ten feet are uſually allowed ſeventeen hundred or eighteen hundred bricks. Flint, or boulder walls, are much uſed in ſome parts of Suſſex and Kent, for fence-walls, round courts, gardens, &c. A right and left-handed man fits well for this work, as they have a hod of morter poured down upon the work, which they part between them, each ſpreading it towards himſelf, and ſo they lay in the flints. The mortar for this work muſt be very ſtiff.

WALLNUT-TREE, the name of a well known tree, formerly held in great eſteem in this country, for its wood, which is, in fact, often very finely veined; but, on account of its aptneſs to be worm-eaten, it has of late given place to the beautiful and much ſounder mahogany, with which our cabinet-makers have been pretty plentifully ſupplied from the Britiſh ſettlements in the Weſt-Indies.

As an uſeful fruit tree, independent of its timber, which is, however, ſtill of good value, it merits the huſbandman's attention; nor can the gentleman eaſily find a more ſtately one to adorn his park with, or to form a noble avenue to his manſion.

Theſe trees are raiſed from their nuts, which it is beſt to keep in dry ſand, with their outer covers on, till February; that being the right time for planting them. If they are intended for timber trees, they ſhould be ſown in the places where they are to remain, in order that the breaking or otherwiſe ſhortening of their roots, and eſpecially thoſe of the tap kind, may not ſtint their growth, and make them run out in branches: but if they are deſigned for fruit, their fertility will be encreaſed by tranſplanting them, becauſe their downright roots, which are thoſe that chiefly encourage the luxuriant growth of wood in all ſorts of trees, will be thereby checked, and they will be made, in lieu of them, to ſtrike out numbers of lateral roots, which as experience has proved, always conduce greatly to the production of the largeſt and faireſt fruit. The moſt proper ſeaſon for tranſplanting them is when their leaves begin to decay; and the beſt age, when they have had three or four years growth in the nurſery. Mr. Miller ſays he has frequently experienced

enced that there is little danger of their ſucceeding altho' they be eight or ten years old when they are tranſplanted: but, however that may be, it is certain that they will root beſt, grow largeſt, and laſt longeſt, if they are removed young. The leſs their branches are cut at the time of tranſplanting, or indeed at any time after, the better they will proſper; for much lopping often cauſes them to decay: but if there be a neceſſity for taking off any of their boughs, it ſhould be done early in September, that the wound may have time to heal before the cold and wet come on. It is likewiſe eſſential to cut the branch off quite cloſe to the trunk, leſt the ſtump which is left ſhould decay, and rot the body of the tree; to prevent which, eſpecially if the wound be large, it will be right to ſmooth it well with a chiſſel, and then to cover it over carefully with a cement of clay or wax, as in the caſe of grafting, with a piece of tarpawling, or of ſheet lead, over that.

Theſe trees ſhould not be planted nearer together than forty feet, and more may yet be better, if they are deſigned for fruit. They delight in a firm, rich, loamy ſoil, or ſuch as is inclinable to chalk or marl; and they will thrive very well in ſtony ground, or on chalk hills, as is evident from thoſe large plantations near Leatherhead, Godſtone, and Carſhalton in Surry, where great numbers of theſe trees planted upon the downs produce annually large quantities of fruit, to the no ſmall advantage of their owners.

In order to preſerve this fruit, it ſhould be left upon the tree till it is thoroughly ripe, and then, as it would be exceedingly troubleſome to gather it by hand, it may be beaten off, but not with ſuch violence as is commonly uſed, from a miſtaken notion that the tree is improved thereby; for moſt certainly it cannot be benefitted by that rough way of forcing off the young wood upon which this fruit grows. The nuts thus obtained ſhould be laid in heaps for two or three days, after which they ſhould be ſpread out, and when they have parted from their huſks, which they will then ſoon do, and have afterwards been well dried in the ſun, to remove the moiſture of their ſhells, which would otherwiſe make them mould, they ſhould be laid up in a dry place, where neither mice nor other vermin can get at them. In this manner they will remain good for four or five months: or, which is a yet better way, and will keep them ſtill longer, let them, when their outward moiſture has been dried by the ſun, be put up in jars, or other cloſe veſſels, with dry ſand between their interſtices. The laying of them for four or five hours in an oven gently heated, as is the practice of ſome, will indeed dry the germ, and prevent their ſprouting: but if the oven is too hot, it will make the kernels ſhrink, and prevent their being peeled with any tolerable eaſe.

Were it only for the oil that theſe nuts afford, the trees which produce them would be worth ſome care. Mr. Evelyn ſays that one buſhel of them will yield fifteen pounds of peeled kernels, and that theſe will yield half that weight of oil, which the ſooner it is drawn, is the more in quantity, though the drier the nut, the better in quality. He adds, that the lee, or marc of the preſſing, is excellent to fatten hogs with. Certainly it would be good manure for land; as are the cakes of lin-ſeed, rape, &c. after the oil has been ſqueezed out of them. The green huſks boiled, without any mixture, make a good colour to dye a dark yellow. The kernel being rubbed upon any crack or chink of a leaking veſſel, ſtops it better than either clay, pitch, or wax.

The French are very fond of the kernels of theſe nuts ſcooped out of the ſhells before they are hardened, with a ſhort broad braſs knife; becauſe iron ruſts, and communicates a diſagreeable taſte to the kernels. When ſcooped out, they are ſteeped in ſalt and water for a few hours before they are ſet upon the table, as well to take off all taſte of bitterneſs, as to make them peel with the utmoſt eaſe.

WANG-TOOTH, a jaw tooth.

WANT, a mole. *See the article* MOLE.

WANTY, a broad girth of leather, by which the load is bound upon a horſe.

WAPENTAKE, the ſame with what is commonly called a hundred, and generally uſed in the northern counties beyond the Trent.

WARBLES, ſmall hard tumours on the ſaddle part of a horſe's back, occaſioned by the heat of the ſaddle in travelling, or its uneaſy ſituation.

A hot greaſy diſh-clout at firſt frequently applied, will ſometimes remove them. Camphorated ſpirits of wine are alſo very effectual for this purpoſe to diſperſe them, eſpecially if a little ſpirit of ſal ammoniac be added to the camphorated ſpirit. If there be a neceſſity for working the horſe, care ſhould be taken to have the ſaddle nicely chambered.

WARP, miſcarry, ſlink her calf.

WARREN, a franchiſe, or place privileged, either by preſcription or grant from the king, to keep beaſts and fowl of warren in; as rabbits, hares, partridges, pheaſants, &c.

By ſtatute 21 Edw. III. a warren may lie open, and there is no need of cloſing it in, as there is a park.

In the ſetting up a warren, great caution is to be uſed for the fixing upon a proper place, and a right ſituation. It ſhould always be upon a ſmall aſcent, and expoſed to the eaſt or the ſouth. The ſoil that is moſt ſuitable, is that which is ſandy; for when the ſoil is clayey or tough, the rabbits find greater difficulty in making their burrows, and never do it ſo well; and if the ſoil be boggy or mooriſh, there would be very little advantage from the warren, for wet is very deſtructive of theſe animals.

All due precautions muſt be taken, that the warren be ſo contrived, that the rabbits may habituate themſelves to it with eaſe. Many would have it, that warrens ſhould be encloſed with walls; but this is a very expenſive method, and ſeems not neceſſary nor adviſable; for we find but very few that are ſo, and thoſe do not ſucceed at all the better for it.

The dung of rabbits is a great fertilizer of uſeleſs lands, and Mr. Mortimer tells us that he has known vaſt crops of rye upon barren lands that have been old warrens well dunged by rabbits; and large oak and aſh upon the ſame, though the ſoil was very ſhallow.

WASTE, a name given to ſuch lands as are in no man's poſſeſſion but lie common.

WATER, a ſimple, fluid, and liquid body, reputed the third of the four vulgar elements. Sir Iſaac Newton defines water to be a fluid ſalt, volatile and void of taſte: but this definition Boerhaave ſets aſide, inaſmuch as water is a menſtruum, or diſſolvent of ſalts and ſaline bodies, which does not agree with the notion of its being a ſalt itſelf; for we do not know of any ſalt that diſſolves another. This laſt-mentioned philoſopher, therefore, defines water, a very fluid, ſcentleſs, taſteleſs, tranſparent, colourleſs liquor, which turns to ice with a certain degree of cold.

Though

Fig. 1.

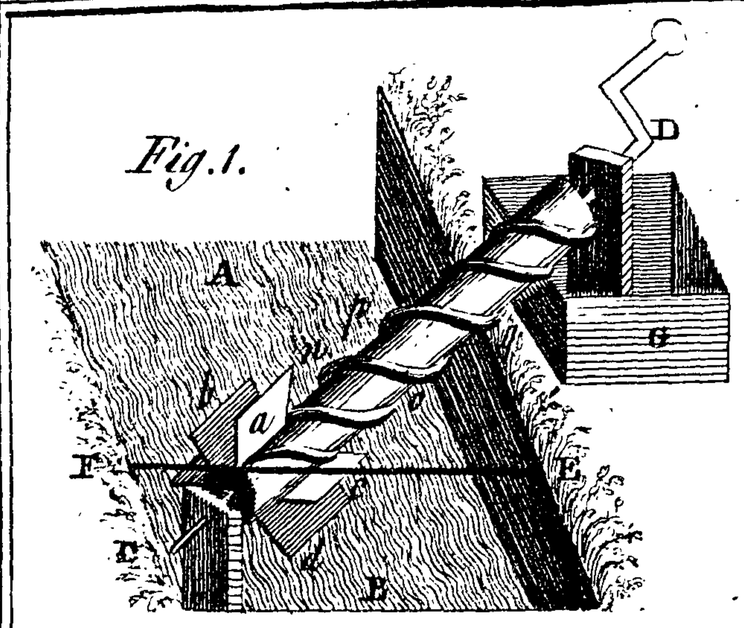


Fig. 3.

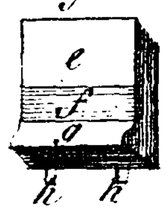


Fig. 4.

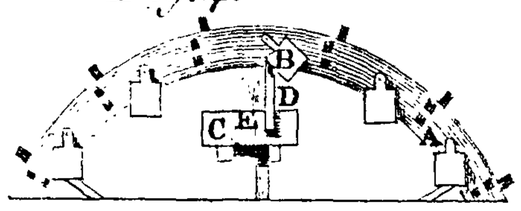


Fig. 2.

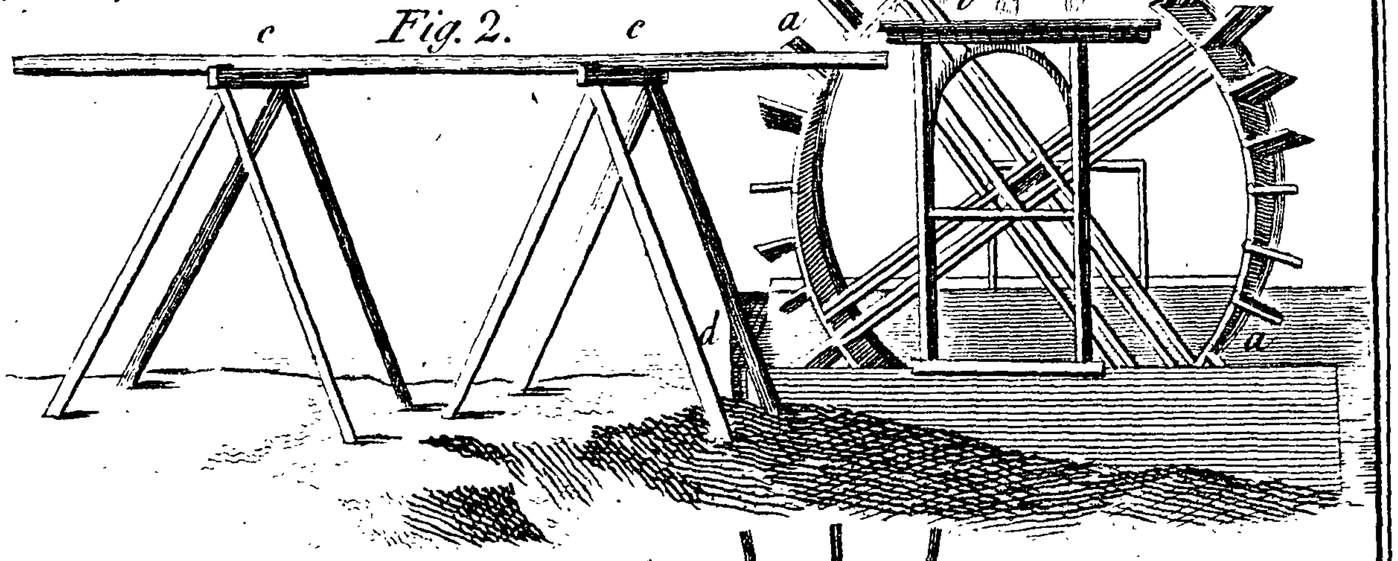


Fig. 5.

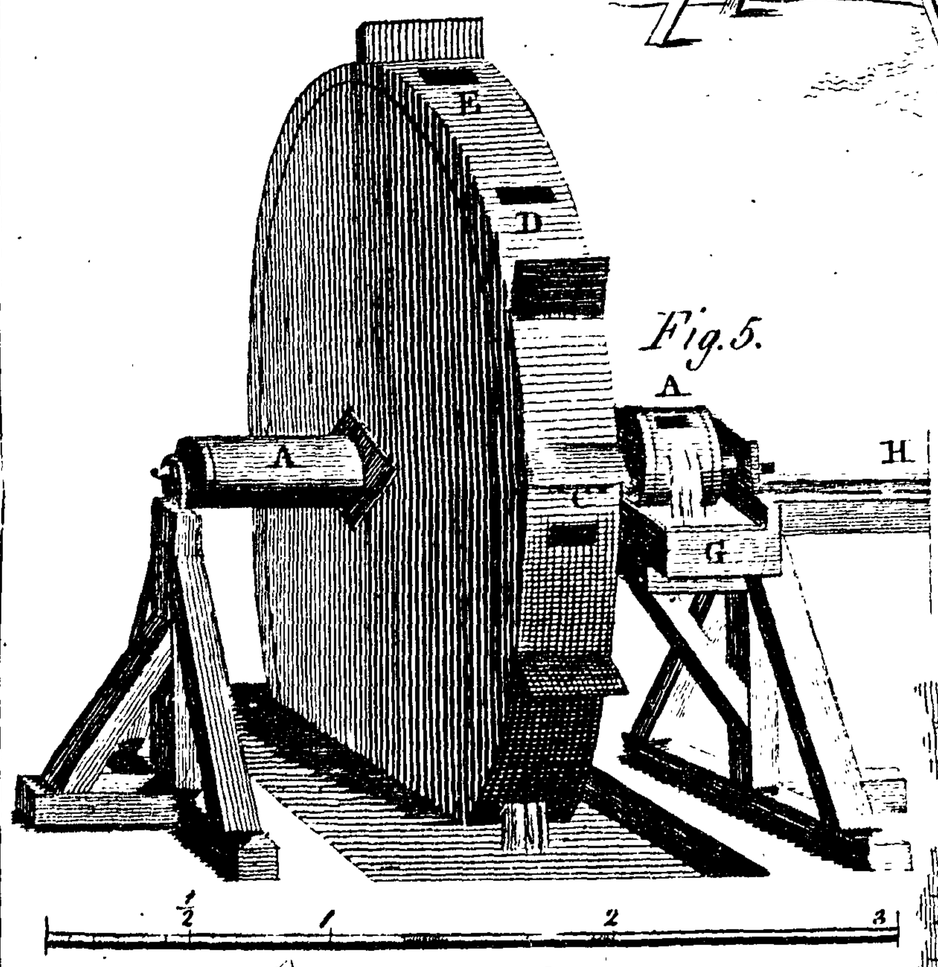
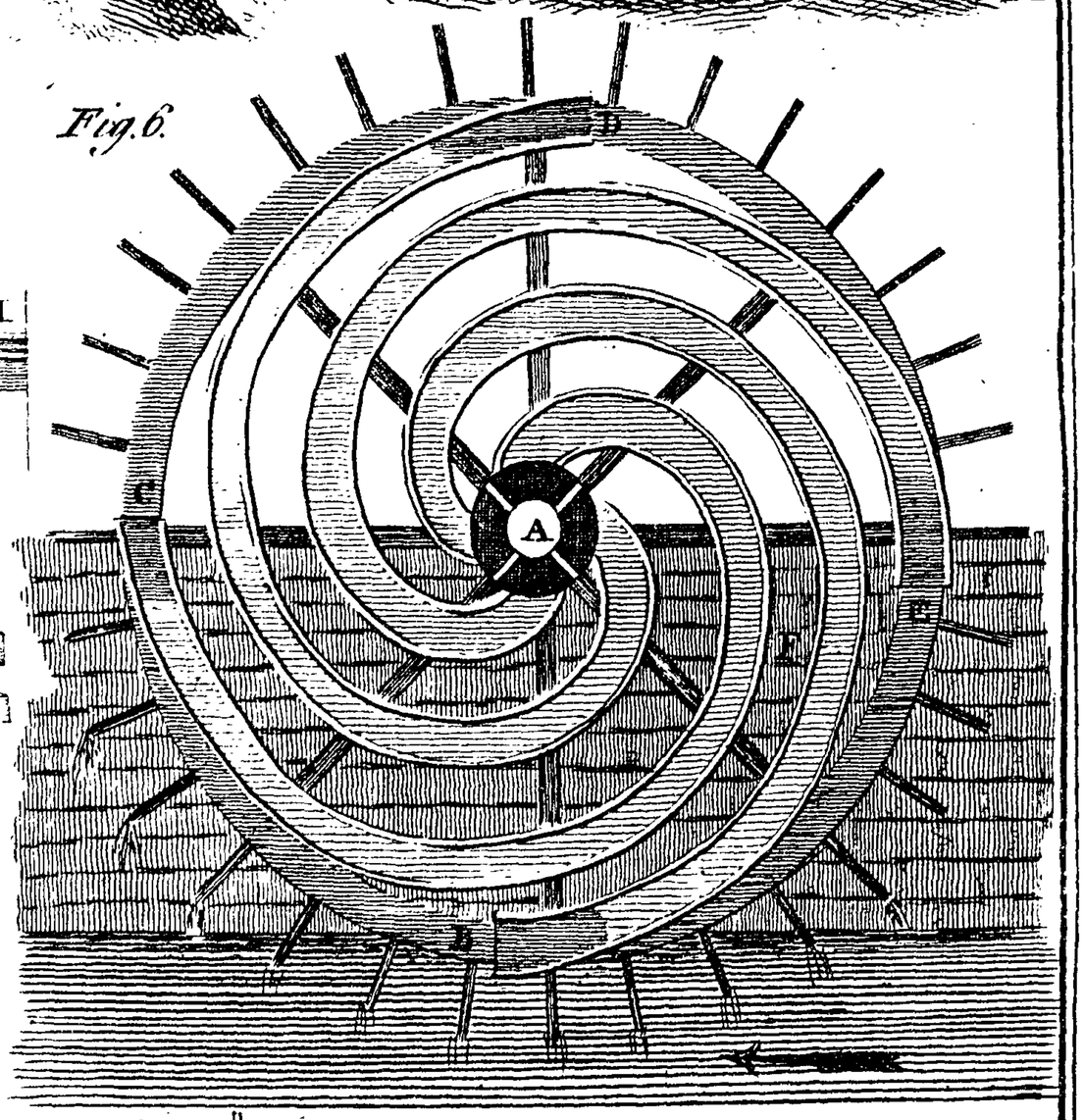


Fig. 6.



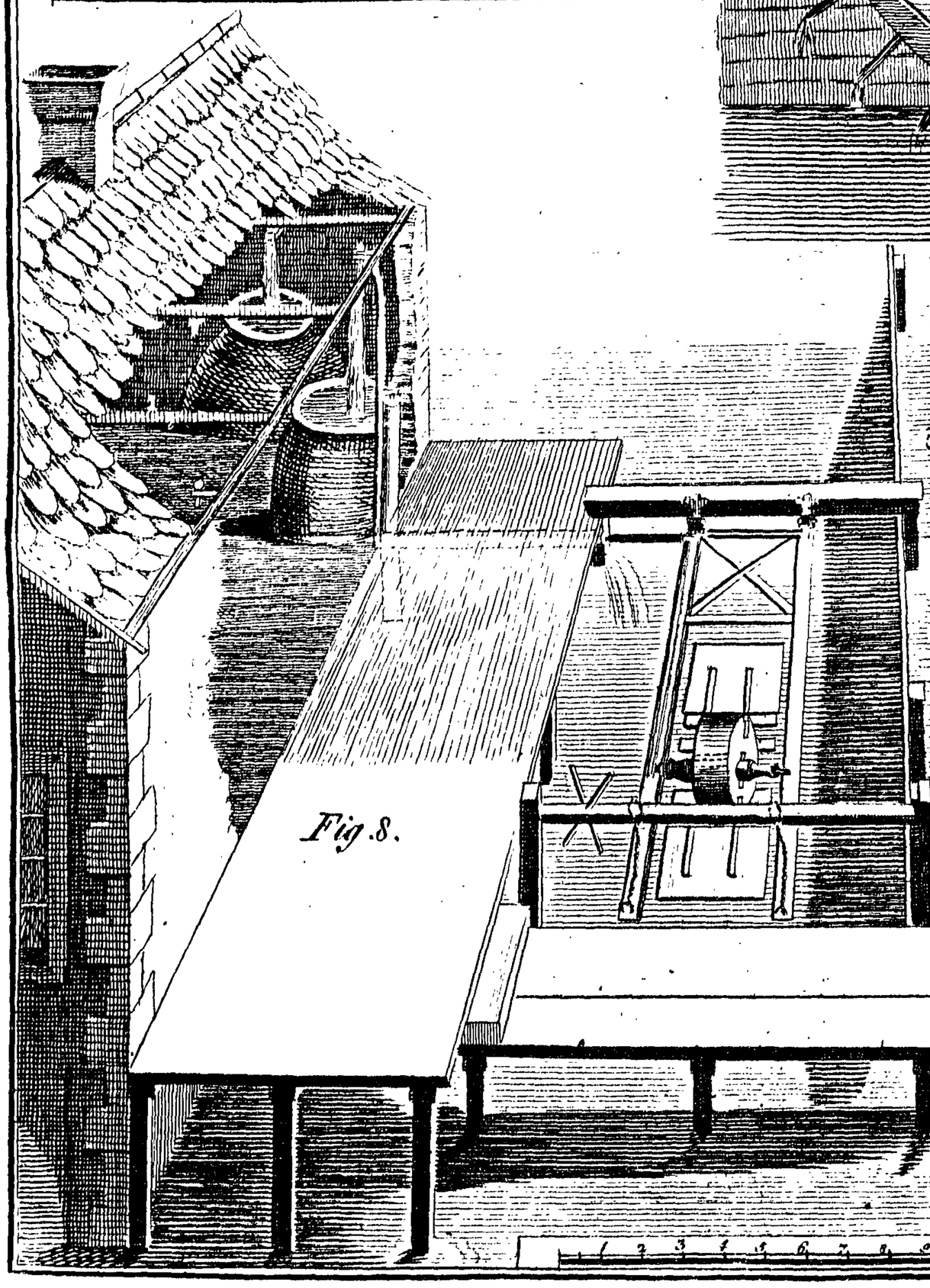


Fig. 7.

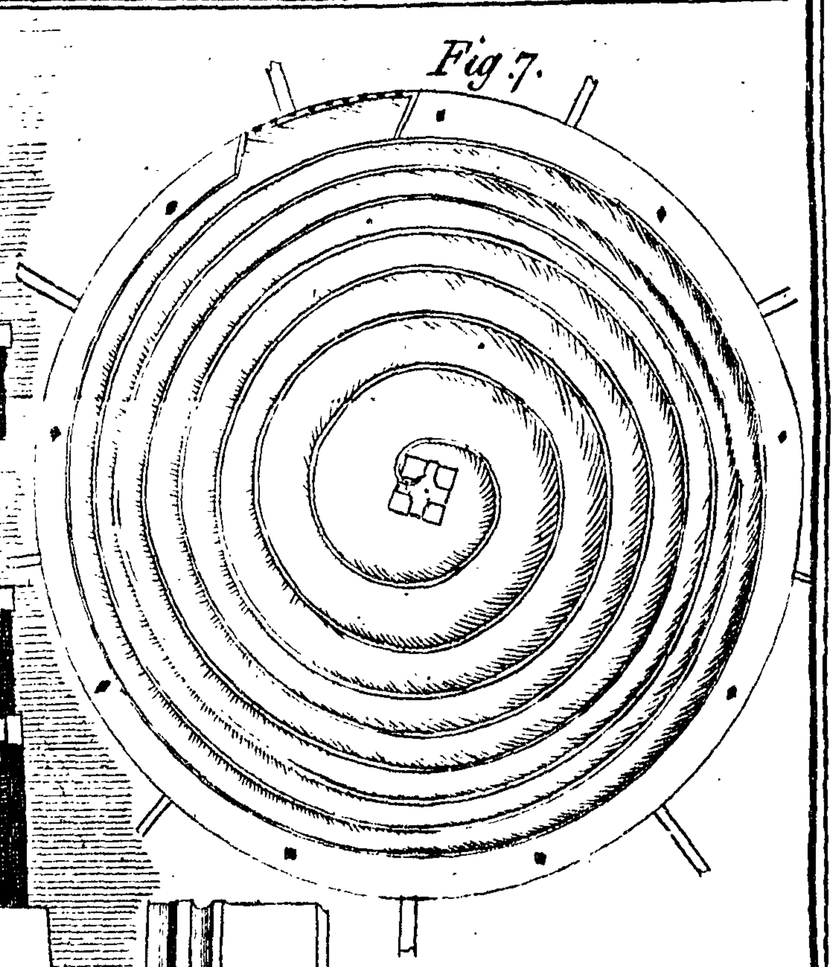


Fig. 9.

Though water be defined a fluid, it is a point controverted among philoſophers, whether fluidity be its natural ſtate, or the effect of violence. We ſometimes find it appear in a fluid, and ſometimes in a ſolid form; and as the former, in our warmer climate, is the more uſual, we conclude it the proper one, and aſcribe the other to the extraneous action of cold.

Boerhaave, however, aſſerts the contrary, and maintains water to be naturally of the cryſtalline kind; ſince, wherever a certain degree of fire is wanting to keep it in fuſion, it readily grows into a hard glebe, under the denomination of ice. Mr. Boyle is of the ſame opinion. Ice, he obſerves, is uſually ſaid to be water brought into a preternatural ſtate by cold; but with regard to the nature of things, and ſetting aſide our arbitrary ideas, it might as juſtly be ſaid, that water is ice preternaturally thawed by heat.

If it be urged, that ice, left to itſelf, will, upon the removal of the freezing agents, return to water; it may be anſwered, that (not to mention the ſnow and ice which lie all ſummer on the Alps, and other high mountains, even in the torrid zone) we have been aſſured, that in ſome parts of Siberia, the ſurface of the ground continues more months in the year frozen by the natural temperature of the climate, than thawed by the heat of the ſun; and a little below the ſurface of the ground, the water which chances to be lodged in the cavities there, continues in a ſtate of ice all the year round, ſo that when, in the heat of the ſummer, the fields are coverd with corn, if you dig a foot or two deep, you ſhall find ice and a frozen ſoil.

Water is generally divided into ſalt and freſh, with regard to the ocean and rivers. But, according to Dr. Shaw, it ſeems diviſible into as many different ſpecies, as the earth is into beds. Thus there are mineral waters of various kinds, acccording to the mineral ſubſtance they run over, and become impregnated with; though this impregnation ſometimes happens in the way of vapour and exhalation. Water, therefore, in general, may be as mixed a body as earth, and perhaps neither of them naturally exiſts in any conſiderable purity.

In a general analyſis of water, the Doctor found,

1. That common warm water throws up numerous little bubbles, and explodes, in the exhauſted receiver of the air-pump; for which reaſon, water contains what may, by way of diſtinction, be called œther or ſpirit.

2. It contains a merely aqueous part, diſtinct from æther and the ſediment, as appears from diſtilled common water.

3. It contains a dry ſolid matter, which is either earthy or ſaline, as appears upon a full evaporation and from the inſides of tea-kettles, which, after long uſe, are lined with a ſtony matter, that beats off in flakes or cruſty pieces.

Water is not only contained in the earth as in a reſervoir, but likewiſe floats in the atmoſphere. In both caſes, it is actuated, rarefied, and put in motion by heat, ſo as to prove inſtrumental in producing effects. Thus it produces clouds, rains, dews, ſprings, and rivers. It refreſhes the earth, recruits vegetables, and is the ſupport of fiſh and other animals by conveying nutriment to all their parts. It is alſo the firſt and immediate inſtrument of fermentation, putrefaction, corruption, and change in all vegetable and animal ſubjects.

But the nature and uſes of water, will beſt appear from the following experiments:

1. That water is contained in many ſolid bodies, and to appearance in dry bodies, was proved thus: a piece of the hardeſt and drieſt bone being procured, and diſtilled in an earthen retort, with degrees of fire, a very large proportion of water, along with much oil and volatile ſalt, was obtained: whence it appears, that animal matters are reſolvable into the four chemical principles, water, oil, ſalt, and earth. This experiment holds true even of the oldeſt hartſhorn, the drieſt and hardeſt woods, earths, and pulverized ſtones.

Whence it alſo appears, that water may be concealed in ſolid bodies, and make a conſtituent part thereof: for it is not meant that water inſinuates itſelf into the ſuperficial pores of bodies, ſuch as wood, ſkins, &c. ſo as to ſwell them in moiſt weather, and leave them ſhrunk in dry; but that it remains permanently intermixed as an eſſential ingredient, or as a part of ſolid bodies. *See* BODY.

2. That water may be collected from the drieſt air, or in the hotteſt climate, was proved by the following experiment:

Half a pint of common water was put into a cylindrical glaſs, wiped perfectly dry on the outſide; then was added to the water, two ounces and three quarters of pulverized and dry ſal ammoniac; theſe were ſtirred briſkly together, whereupon the water floating in the external air, was, by the coldneſs thus produced, condenſed on the outſide of the glaſs as the ſalt diſſolved within, and trickled down in ſmall veins, into the ſhallow baſon ſet underneath to receive it.

This experiment holds in all climates and places of different heights where it has been tried; whence, by the law of induction, we make it univerſal, till any contradictory inſtance appears. Thus, therefore, it may hold in the moſt parched countries and hotteſt ſeaſons, ſo as to afford an agreeable method of cooling potable liquors, and render them more refreſhing. For if the containing glaſs of the ſalt and water be ſet in any liquor, the liquor will be cooled thereby; and if any conſiderable improvement could be made in the contrivance, it is obſerved, that it might, in ſome meaſure, ſerve to ſupply the thirſty traveller in parched deſarts, and the ſailors with freſh water at ſea.

3. To determine the proportion of water contained in an aſſigned portion of the atmoſphere, we are directed by the following experiment:

Having by means of the air-pump, and an exact pair of ſcales, found the weight of a certain quantity of air, contained in a large glaſs veſſel, there was included therein a certain known weight of well dried potential cautery, whoſe property it is powerfully to attract the moiſture of the air. The veſſel was kept cloſe ſtopped for ſeveral hours; during which time, the potential cautery was grown wet, in which ſtate being weighed again, it was found conſiderably to encreaſe; which muſt be either owing to the water attacted out of the air in the glaſs, or to a condenſation of the air itſelf into an aqueous fluid; for ſuch a fluid might now by diſtillation be obtained from the matter thus run per deliquium.

It is obſerved that there is room to ſuſpect, that if this experiment were made in perfection, a weight of water almoſt equal to that of the air included in the veſſel, might be thus obtained, which might prove an extraordinary diſcovery, and ſhew what ſome have endeavoured to prove, that the matter of common air is little more than water.

4. That

4. That an earthy ſubſtance is naturally contained in water, was proved as follows. Three ſeveral glaſſes were filled with pure rain-water, ſpring-water, and Thames-water, and ſuffered to ſtand, cloſe covered, for ſome days before they were exhibited. There was an earthy ſediment then depoſited in all the three, but moſt in the Thames-water, the ſediment whereof was not only larger, but alſo more foul and muddy than in the rain-water; though here, alſo, it was dirty, perhaps, becauſe not carefully collected; whereas, in the pump-water, it was white, ſcaly, flaky, and ſhining, like fine ſpangles of talc. This experiment is alſo univerſal, ſo far as it has been tried with care, and holds true of the waters of all ſpecies, and all countries, particularly in thoſe called mineral waters, from which an earthy ſubſtance may uſually be precipitated by art, in a conſiderable proportion.

Certain experiments carefully made, and repeated, ſhew that the terreſtrial matter naturally contained in water, has a principal ſhare in the growth and encreaſe of vegetables; all the plants that thrive in water appearing to enlarge their bulk in proportion to the earthy matter they draw from the water. Whence pure elementary water ſeems but a kind of vehicle to convey this nutrimental or ſubſtantial part, and depoſite it in the veſſels through which the water moves, in order to its general exit at the ſurface of vegetables. But we are not here to exclude the inſtrumental efficacy of the two other elements, fire and air. And this appearing to be the general office of water, in the whole animal and vegetable kingdoms, viz. the conveyance or diſtribution of the alimentary matter to all their parts, it may be proper to conſider its phyſical properties, which would wonderfully fit it for this office.

The figure of its component parts appears to be ſmooth and ſpherical, like thoſe of quickſilver; whence it becomes extremely moving and penetrating. Thus it readily enters the pores of wood, leather, ſkins, chords, muſical ſtrings, &c. thus likewiſe it becomes capable of moving and agitating particles of matter leſs active than itſelf, and ſo proves the more immediate phyſical agent of fermentation, putrefaction, ſolution, &c. and thus it alſo conveys earthy and ſaline matters through our filtres of paper, ſtone, &c. and even raiſes ſome proportion of them in diſtillations. Its particles likewiſe appear to be extremely minute, and ſo have a large ſhare of ſurface.

Hence water is admirably fitted for a ſolvent, or for readily entering the pores of ſalts, and coming into full contact with all their particles; and thus it will paſs when air cannot, on account of its moiſture, or lubricating power, whereby it faſtens mucilaginous matters, and will therefore ſoak through the cloſe pores of a bladder.

The ſpecific gravity of water, and conſequently its goodneſs by its lightneſs, are to be directly judged of by the hydroſtatical balance. This experiment is a good ſubſtitute for ſeveral other ways of examining the purity and goodneſs of waters both common and mineral; for it appears by numerous inſtances, that light waters are, *cæteris paribus*, the beſt, pureſt, and wholeſomeſt. That water is accounted beſt and wholeſomeſt, which is not only the lighteſt and freeſt from earthy ſediment, but that which is moſt ſpirituous; and theſe properties are uſually found in pure rain-water; that being naturally diſtilled from the ocean and rivers, or by the heat of the ſun raiſed up into the atmoſphere, from whence it is returned much after the manner of common diſtillation.

From the preceding, and other experiments of Dr. Shaw, made upon water, he deduces the following axioms:

Firſt, we have ſeen, That water is naturally contained in ſome of the drieſt and hardeſt bodies, and in the drieſt air. 2. That itſelf naturally contains an earthy ſubſtance. 3. That it is the proper menſtruums of ſalts, diſſolving more of one, and leſs of another. 4. That one good ſign of its purity and wholeſomeneſs is its levity. 5. That the ingredients of a mineral water may be diſcovered by chemical expedients: and, 6. That mineral waters are imitable by art from ſuch diſcovery.

Secondly, That water is of infinite uſe in all the works both of nature and art, as without it there could be no generation, nutrition, or accretion, performed in any of the animal, vegetable, mineral, marine, or atmoſpherical regions. The blood could not flow in the veins, the ſap in the veſſels of vegetables, nor the particles of minerals concrete and grow together, without water. It is this that makes the largeſt part of our blood, our drink, and other aliments. There could be no corruption, fermentation, or diſſolution, carried on without it; no brewing, no diſtilling, no wines, no vinegar, no ſpirits, made without it.

Thirdly, That we meet with water under an infinite variety of forms, and in an infinite variety of bodies, as that of air, vapour, clouds, ſnow, hail, ice, ſap, wines, blood, fleſh, bone, horn, ſtone, &c. through all which it ſeems to paſs unaltered, as an agent or inſtrument that ſuffers no alteration by re-action, but remains capable of reſuming the form of water again upon occaſion.

Fourthly, That water, in its own common ſtate, appears to be a combination of all the elements together, as containing a quantity of fire, which keeps it fluid: a quantity of air, and a quantity of earth: whence it can be no wonder that water alone, as it appears to the ſenſes, ſhould ſuffice for vegetation in ſome caſes, where little earth is wanted, or for ſupporting animal and mineral life, where no great degree of nutriment is required; and hence it proves a gluten, or cement, to ſome bodies, and a ſolvent to others: thus it conſolidates brick, plaſter of Paris, ſtone, bone, &c. but diſſolves ſalts, and ſubtile earths approaching to ſalts, and becomes the inſtrumental cauſe of their action.

Fifthly, That water conveys nouriſhment, or a more fixed and ſolid matter to the parts of vegetables, where having depoſited it, the finer fluid perſpires into the atmoſphere, which gives us the phyſical cauſe of the dampneſs and unwholeſomeneſs of woody countries, as they remarkably find in America. For all large vegetables act after the manner of forcing-pumps, and continually draw in large quantities of water at their roots, and diſcharge it at their leaves, which intimates a method of collecting water in dry countries, and likewiſe of making ſalt-water freſh.

Sixthly, That the water in paſſing through plants, after having depoſited its more terreſtrial part, does not always go off pure, but impregnated with the finer effluvia, or more ſubtle particles of the vegetable; thus, making an atmoſphere round every plant, according to its nature odoriferous or otherwiſe, which ſupplies us with a rule for procuring the odoriferous waters of vegetables by diſtillation.

Seventhly, That the particles, not fine enough to go thus along with the water, are left behind upon the

ſurface

ſurface of the leaves and flowers of plants, being now thickened, or ſtrained from the moiſter plants, and remaining in the form of honey, manna, gums, balſams, &c. according to the nature of the vegetable. And hence appears the phyſical cauſe of plants proving more odoriferous and ſweet when the weather is both warm and moiſt, as immediately after a ſummer's ſhower.

Eighthly, That the chemical operator ſhould form to himſelf an hygrometer, for the ſervice of his elaboratory, to determine the proportion of water at all times contained in the air, which continually mixes with his preparations, differently augments their weight, and promotes or hinders many of his operations.

Ninthly, That pure water makes the largeſt part of mineral-waters, where it is impregnated as a menſtruum, with ſeveral ingredients that it diſſolves or drinks up in its paſſage through the earth.

Tenthly, and laſtly, The preceding enquiry affords conſiderable light for diſcovering practicable ways of making ſea-water freſh and potable, and of preparing waters by art, ſo as to render them fitter for the common œconomical uſes, and the ſervice of many particular arts.

But though water is abſolutely neceſſary to the growth of vegetables, and experience hath long evinced the great advantages ariſing from the overflowing of paſtures, it is but of late years that this very profitable improvement is become pretty general in England; nor is it, as Mr. Worlidge obſerves, "yet carried to near the perfection it might be advanced unto, if the following obſtructions were removed.

"1. The ſeveral intereſts that are in lands bordering on rivers, hinder very much this improvement, becauſe the water cannot be brought over ſeveral quantities of land ſo circumſtanced, but through the ground of ignorant and croſs neighbours, who will not conſent thereunto (though for their own advantage alſo) under unreaſonable terms; and ſome will not at all. Others, again, are not, by law, capacitated for ſuch conſent.

"2. A great and pernicious impediment to this improvement is the mills that ſtand on many fruitful ſtreams; prohibiting the laborious and ingenious huſbandman to receive the benefit and advantage of ſuch ſtreams and rivers, which carry in their bowels much wealth into the ocean, while the mills themſelves yield not a tenth of the profit to the owners, that they hinder to their neighbours, and their work may be as well performed by the wind, as by the water.

"3. Another grand impediment is the ignorance of the countrymen, who are commonly poſſeſſed with a fooliſh opinion, that the water leaves all its fatneſs on the ground it firſt flows over, and therefore will not benefit the next; which is moſt untrue; for I have ſeen meadows ſucceſſively drowned with the ſame water, to almoſt an equal improvement for many miles together. It is true, the water leaves behind it a great part of the fatneſs which it hath waſhed from the hills and high-ways in the time of great rains: but we find by daily experience, that meadows are fertilized by overflowing, as well in clear and dry weather, as in rainy, and that to a very conſiderable degree. The cleareſt and moſt tranſparent ſtreams will improve even ordinary lands, ſo much as to render them very fertile meadows.

"4. From a greedy and covetous principle, the graſs is ſuffered to ſtand ſo on the watered meadows, that it becomes much diſcoloured, grows haulmy, and is neither ſo toothſome nor ſo wholſome, as that of unwatered meadows.

"5. The former of theſe impediments might eaſily be removed by a law, which would be of very great advantage to the kingdom in general. The latter can be remedied only by the example of ſuch induſtrious and worthy perſons as underſtand better things: the generality of the world being rather introduced to an ingenious and profitable enterprize by example, than by precept: although ſome are ſo ſordid and ſelf-willed, that neither apparent demonſtration, nor any convincing argument whatſoever, can divert them from their bias of ill huſbandry."

The induſtrious Swiſs, ſenſibly attentive to every means of benefitting their deſervedly cheriſhed country, have thought this branch of huſbandry of ſufficient importance to propoſe it for the firſt premium offered by their truly laudable Society at Berne, for the year 1760: and I gratefully confeſs myſelf indebted to the diſſertations produced thereby, for ſeveral of the following remarks.

Water not only acts as a vehicle to the nouriſhment of plants, but alſo carries with it many particles which enrich the ſoil; eſpecially after heavy rains. It then depoſits a fertilizing ſediment, which turns the mould to a blackiſh colour. The common ſaying, that watering makes the ſtones diſappear, is true; not ſo much from their ſinking into the earth, as from their being covered by the new ſupply of mould brought by the ſlimy muddy water, particularly after great rains. Watering likewiſe promotes the putrefaction of every vegetable and animal ſubſtance found in the earth, and thereby contributes greatly to meliorate the ſoil underneath the ſward.

Plants which grow on dry paſtures contain richer and more nouriſhing juices, than thoſe which grow in moiſt places. Care ſhould therefore be taken, that the quantity of moiſture brought upon the paſture, be only ſuch as ſhall give vigour to the plants, without over-charging their veſſels. In order to do this, every part of the paſture ſhould be watered equally, and as little water as poſſible ſhould be ſuffered to go where the land is naturally moiſt.

Extreme heat ſhould alſo be avoided in watering; becauſe heat draws the moiſture too haſtily up into the plant, which is thereby filled with a watery juice, and rendered of ſo tender a texture, as eaſily to be killed afterwards by drought or cold.

If the ſpring proves dry, paſtures may be watered as ſoon as the froſty ſeaſon is over; and this may be continued till the graſs begins to ſhoot. But if the winter has been ſevere, and the earth remains moiſt, no current of water ſhould be admitted, till the earth looſened by the froſt is ſettled, and the ſurface become pretty dry: for even the gentleſt ſtream would carry off the fine mould looſened by the froſt. After that the graſs has begun to ſhoot, and the weather is become mild, the water ſhould be adminiſtered more ſparingly; that is to ſay, in ſuch proportion only, as juſt to puſh the graſs gently on, till it has made ſuch a covering as can ſhelter the earth from the too great power of drying winds, or of a ſcorching ſun. Watering ſhould afterwards he uſed with great caution, and only in caſe of extreme drought; nor even then, unleſs the water be perfectly clear and ſweet, leſt it ſhould foul the graſs, or give it a bad taſte. If it be admitted ſparingly before the hay is cut, it will make the graſs ſtand the better to the ſcythe.

For a little time after the hay is made, the water ſhould be admitted only in the night; becauſe the weather then

generally is very warm: for it is obſerved, that rain which falls with a hot ſun, or a hot ſun that comes on a heavy dew, is prejudicial to plants. Watering, under the ſame circumſtances, will have the ſame effect; to prevent which, the prudent huſbandman will let in his water only in the evening, and will withdraw it again before the ſun gets up. It is continued at this ſeaſon only till the graſs begins to ſhoot vigorouſly; and in caſe of very great drought it may be repeated, but very ſparingly.

If a ſecond crop of hay is made, the water may be uſed more freely; as the weather is then become cooler, and the earth is generally very dry. This flooding will bring up a plentiful after-math. If the ſecond crop of graſs is fed off, the watering ſhould be renewed in the ſame manner: only care ſhould be taken not to ſuffer cattle to feed on the ground while the water is upon it, becauſe their poaching would deſtroy the roots of much of the graſs, and leave the ſurface uneven; which ſhould be avoided in a paſture.

The latter end of autumn is the ſeaſon in which watering is the longeſt continued: and conſidering the dryneſs and parched ſtate of the earth at that time, this practice ſeems rational: for the water then, not only ſupplies the moiſture wanted in the earth, but it diſſolves every ſubſtance ſoluble in water, and thereby converts to an additional manure, what might otherwiſe have remained long in its original ſtate. Care ſhould, however, be taken, to drain off the water before the ſeaſon of ſtrong froſts is expected; becauſe froſt is obſerved to deſtroy all kinds of vegetables much more when the plants are full of ſap, than when they are in a dryer ſtate. We may eaſily comprehend that it muſt have this effect, when we conſider with what force it breaks every veſſel containing water expoſed ſo as to be frozen: for froſt dilates all fluids to ſuch a degree, that the veſſels in which they are muſt be broken thereby. Hence it is that ſucculent plants ſoon become a putrid maſs after a hard froſt: and thus it is that the ſtrongeſt trees are ſometimes burſt with a loud report.

When the water is brought to the deſired height, the main channel ſhould be cut, with ſuch a deſcent as only juſt to keep the water in a gentle motion. The channel ſhould be made in the higheſt part of the paſture, and proportional to the quantity of water neceſſary to be introduced. If a hollow intervenes between the place at which the water is brought into the field, and another riſing ground in that field, it will be worth the farmer's while to convey it a-croſs that hollow, by pipes made of wood, or any other ſubſtance, laid either horizontally over that hollow, or underneath it. The motion of the water in this horizontal channel ſhould be different, according to the quality of the ground. If it is a ſtrong earth, the channel may be cut nearly horizontally: but if it is a light looſe ſoil, a quicker current ſhould be given to the water, in proportion to the degree of lightneſs of the earth; or great part of the water will otherwiſe be loſt, by ſinking into it. In a light ſoil of this kind, it may be proper to line this main channel with brick or ſtone, well cemented with lime, to hinder the water from eſcaping through the crevices; or at leaſt to cover it with clay well rammed. As to the degree of deſcent moſt proper for the main channel, in order to give a current to the water, M. Bertrand, to whom we owe one of the ingenious diſſertations on this ſubject in the memoirs of the Berne Society, obſerves, that Vitruvius required ſix inches in an hundred feet, which is a great deal too much: but that the moderns, who have made the moſt exact experiments in this reſpect, are ſatisfied with two inches in ſix hundred feet, when they cannot have more, and recommend particularly the avoiding of all ſharp angles in the winding of the channel, and the making of its bottom quite ſmooth and even. He adds, that this is nearly the declivity of the aqueduct of Rocquancourt, by which the water is conveyed to Verſailles; the diſtance there being three thouſand four hundred yards, and the ſlope, in all, only three feet.

The main channel ſhould be of breadth, rather than depth, ſufficient to receive all the water that is intended to be conveyed through it, and that breadth ſhould leſſen gradually as the water is carried off in leſſer channels, in order that the water may preſs into thoſe ſmaller ducts, which are to iſſue all along from the chief. The leſſer channels ſhould be as ſhallow, and as numerous, as can be: for the more equally the water is diſtributed over the graſs, the greater will be the improvement. They ſhould be made particularly wherever the water collects itſelf into a ſtream: for though cutting ſo much turf may ſeem to waſte a great deal of land, yet it proves not ſo in the end; becauſe the quicker the water runs over the graſs, the more it benefits the paſture.

To keep the channels in repair, they ſhould be frequently cleaned, eſpecially after every cutting of the hay. The ſlime then taken out of them ſhould be ſpread upon the paſture, and the next growth of the graſs will be greatly improved thereby. Care ſhould alſo be taken to have drains to carry off the water, ſo that none of it may ſtagnate upon the land.

The beſt way of watering a flat meadow, which is uſually ſurrounded with a ditch, is to ſtop the out-let of the ditch, and, bringing in a quantity of water, to overflow the whole meadow, for ſuch time as ſhall be judged neceſſary to moiſten the earth ſufficiently: but the water ſhould not be continued upon it ſo long as to wither the graſs. If this can be done in a rainy ſeaſon, it will be ſo much the better; becauſe the water will then be loaded with the enriching mud and ſlime waſhed down from the higher grounds.

The firſt heavy rains which fall in the latter end of the autumn, and which carry with them the rich particles of putrified animals and plants, are thought to be more fertilizing than at any other ſeaſon of the year, and are therefore brought into the paſture, as often as the abſence of the cattle fed on them will permit.

The next beſt to rain, is clear and ſweet ſpring-water, flowing from a copious ſource. Here it is generally objected, that ſpring water is hard, and therefore not fit for the nouriſhment of plants. But Dr. Home, who judges otherwiſe, expreſſes himſelf thus on this very occaſion. "Is not hard water more nouriſhing for vegetables than ſoft water? I imagine that the ſalt of vegetables enters their veſſels in ſuch a form as hath the ſalt which is found in hard waters. The ſalt of hard waters ſeems likewiſe to be of the nitrous kind, of which the nouriſhment of plants is alſo ſuppoſed to be. This query thwarts the general opinion; for no gardener will make uſe of hard water, if he can avoid it. I watered ſome plants with it, and thought that they grew better than thoſe which were watered with ſoft water."

This is confirmed by an ingenious correſpondent of the Berne Society, who made ſeveral experiments on the qualities of different waters, and found that their greater or leſs hardneſs made very little difference in their effects whe

when uſed for watering of paſtures. The water of an excellent ſpring, which, upon trial, was found to be hard, fertilized greatly the paſtures upon which it was let in.

Spring water may be uſed later in the winter, than any other, becauſe, being warm, a mild froſt will not freeze it, even when expanded on the paſture. It ſhould however be turned off ſoon enough to let the earth becomes a little dry before ſevere froſts ſet in. It may likewiſe be uſed earlier in the ſpring, than other waters, and to better advantage, by reaſon of the warmth which it communicates to the ground where it flows: and it becomes extremely proper in the ſummer, becauſe it cools during the night (the only time for watering at that ſeaſon) the heated ſoil, and graſs ſcorched by the power of the ſun.

The equal warmth of ſpring-water, is what renders it peculiarly uſeful for watering paſtures. The laſt quoted correſpondent of the Berne Society tried its heat, in Swiſſerland, on the twenty-ſixth of May, when the earth had been very little warmed by the ſun, after a long winter's cold. He then found M. de Réaumur's thermometer, placed in the ſpring of water, ſtand at eight degrees and a half (equal to forty-ſeven and a half of Farenheit's) above the freezing point. On the fifth of July, in the evening, when the heat of the air was very great, Réaumur's thermometer, again placed in the ſpring, ſtood at nine degrees and a quarter (equal to forty-nine of Farenheit). He afterwards tried whether the warmth of the ſpring was conſiderably increaſed towards the end of the ſummer, when the earth was extremely heated: but even then, Réaumur's thermometer ſcarcely reached ten degrees (equal to about fifty of Farenheit's). By this we ſee, that ſprings which yield a full and conſtant ſtream vary very little in their degrees of warmth.

For the ſame reaſon it alſo is, that a perpetual verdure reigns around ſuch ſprings, even during the hardeſt froſt; and if their water could be preſerved from freezing when ſpread over a field during the winter, it would be right to let them in upon paſtures in that ſeaſon: but as they ſoon loſe their heat when diſperſed over the graſs, this is by no means adviſable.

Experience has taught the inhabitants of the Alps (and the ſame will hold equally true in all mountainous countries), that it is not adviſable to water paſtures with the floods which ariſe from melted ſnow, or with the water of rivers fed thereby. One reaſon which ſeems to render the water that deſcends from mountains perpetually covered with ſnow the leſs uſeful for watering paſtures, is, that as all vegetation is at a ſtand in ſuch places, no vegetable matter can be mixed with this water: and it therefore cannot communicate the fertility which ariſes from waters fraught with thoſe rich ſubſtances.

We are frequently told of correcting the crudity of water, by making it turn a wheel, or putting it otherwiſe into violent motion: but I know not what good effect this can have.

What are commonly called barren ſprings, are ſometimes corrected by mixing dung with their water in ponds made higher than the paſture intended to be watered. Yet this, though an old cuſtom, is liable to ſome objections; one of which, in particular, is, the water will depoſit its richneſs on the firſt part of the paſture over which it flows, and therefore improve the graſs very unequally. But if dung hath this effect, it will anſwer equally well, if it be ſpread upon the land. Care ſhould, indeed, be taken that the current of the water be very ſlow over a paſture newly dunged; becauſe the fertilizing particles of the dung may otherwiſe be carried off by the ſtream, before they can have had time to penetrate into the earth.

When dung, marle, or lime, is laid on a paſture which has a conſiderable deſcent, the beſt way is to lay a larger proportion on the higher parts; becauſe the common rain water will waſh ſome of their richer particles down to the lower.

As clayey ſoils retain water, and by that means chill the plants growing on them, they are the leaſt fit for watering of any. If the water abides on them, they become poachy; and when dried again, they gape, and become ſo hard that no plant can pierce them. Some ſenſible farmers have likewiſe obſerved, that their clayey lands have always yielded leſs graſs in wet years, than when the ſeaſon has been dry; which is a manifeſt proof that a ſoil of this kind does not admit of watering, unleſs it be a little in caſe its ſurface has become hard after the hay has been taken off, or when the graſs is ſhort. Such lands are fitter for arable, if their ſituation permits it.

Hazel earth, which is a loam mixed with gravel, and of a clayey nature, is the ſtrongeſt ſoil that can be watered with propriety; and that this has been ſurpriſingly benefited thereby, is evident from ſeveral inſtances given in the Memoirs of the Berne Society, even of large tracts of ſuch ground that have been vaſtly improved by this means: but I ſhall mention here only the following.

"In the ſummer of 1758, part of the paſture ground belonging to a farmer in Swiſſerland was ſo entirely covered with ſtones and gravel, by the ſudden overflowing of a ſtream, that it looked like a bank of ſand. As the removing of this quantity of ſtones and gravel would have coſt a great deal of labour and expence, the owner of the land carried off only the largeſt ſtones, and threw over the gravel a reddiſh earth taken from a neighbouring hill; but ſo thinly ſpread, as only to fill the interſtices between the pebbles, without entirely covering them. He then ſowed this ſpot with hay ſeeds, and let in upon it the waters of an adjacent ſpring and a neighbouring rivulet. Theſe waters were let in ſparingly at firſt, till the graſs began to appear, and after that they were flowed more abundantly. The conſequence of this prudent conduct was, that the graſs thus raiſed bore cutting once the firſt year, and after having been mowed twice in the ſecond, promiſed an excellent after-math at the time when this account was written, which was in the beginning of the autumn of that ſecond year. The very firſt year's crop grew ſo prodigiouſly, that the graſs was lodged, even though the pebbles were then felt under foot, if one trod upon it." *See the article* MEADOW.

When the land is above the level of the adjacent water, recourſe muſt be had to ſome engine to raiſe it to a proper height, in order to overflow it; though this will be attended with a very conſiderable expence, eſpecially at firſt.

The oldeſt inſtrument uſed for this purpoſe is known by the name of Archimedes's water ſcrew, and is thus deſcribed by Mr. Emerſon.

C *p* D (Plate XXVII. Fig. 1.) is a cylinder which turns upon the axis C D. About this cylinder there is twiſted a pipe, or rather ſeveral pipes, *no*, *pq*, running ſpiral-wiſe from end to end. This cylinder is placed higher at one end, D, than at the other; and its uſe is to ſcrew up the water from the lower end to the higher. A B is a river

running in the direction A B. *a*, *b*, *c*, *d*, are ſeveral floats fixed to the cylinder. E F is the ſurface of the water. As the cylinder ſtands in an inclined poſition, the upper floats *a b*, are ſet out of the water, and the under ones *c d* within it: ſo that the water acts only upon the under ones *c d*, and turns about the cylinder in the order *a*, *b*, *c*, *d*. By this motion, the water taken into the ſpiral tubes at the low end is, by the revolution of the cylinder, conveyed through theſe pipes, and diſcharged at the top into the veſſel G. If A B is a ſtanding water, there is no occaſion for the floats *a b c d*; and then the cylinder is to be turned by the handle at D. Inſtead of the pipe, a ſpiral channel may be cut round the cylinder, and covered cloſe with plates of lead. The cloſer theſe ſpiral tubes are, the more water is raiſed: but it requires more force. Alſo the more the cylinder leans, the more water it carries; but to a leſs height.

Where a conſiderable quantity of water is to be raiſed, a greater force is requiſite, than can be applied to ſuch a handle. Her royal highneſs the princeſs dowager of Wales has cauſed an inſtrument of this kind to be erected at Kew, by the ingenious Mr. Smeaton, and by means thereof a ſufficient quantity of water is ſupplied, for all the ponds, and other uſes, in that elegant and extenſive garden: but it is there worked by horſes.

The moſt common engine for raiſing water is the Perſian wheel, of which Mr. Worlidge gives the following deſcription.

"This wheel is made much after the manner of that of an under-ſhot mill, viz. with a double ring, into which are let two pins, on which the floats are faſtened. Theſe floats are made hollow; the half that is the moſt remote from the wheel, holds the water which is taken in at the open place, above the middle of the back of the float, and as the wheel goes round, and the float laden with water riſes, ſo the water, by degrees, tends towards that part of the float which is next the wheel, and as the float ſurmounts the ciſtern or receiver, the water empties itſelf into it, every float ſucceeding the one the other, emptying itſelf into the receiver: ſo that if one float contains a gallon of water, and there be thirty floats on the wheel, at one motion round, it delivers thirty gallons of water into the ciſtern. Such a wheel will be about fifteen feet diameter, the floats are eighteen inches diſtance, and will deliver the water at eleven or twelve feet above the level of your ſtream, and will go four times round in one minute, and carry up about one hundred and twenty hogſheads of water in an hour, with twelve or eighteen inches penning or ſtopping of but an ordinary current of water which will water very well thirty or forty acres of land: for if your land be cold and clayey, too much water does it hurt; and if it be light, warm, or ſandy, a little water does it much good. It is alſo to be obſerved, that this motion is conſtant, and will laſt many years without repair, ſo that it ſtands not ſtill, for one ſide to dry and wax lighter than the other: alſo obſerve, that the ſlower it moves, the better it delivers the water.

"The view of this wheel we have in Plate XXVII. Fig. 2. *a a a a* ſignify the wheel; *b*, the ciſtern that receives the water; *c c*, the trough ſtanding on treſſes, that conveys the water from the ciſtern to the place you deſire; *d*, the hatch, or pen-ſtock that bays up the water to a reaſonable height, under which the water drives the wheel; *e*, (Fig. 3.) one of the floats preſented open to your eye, apart from the wheel: *f*, the place that is to receive the water; *g*, the open place out of which the water iſſues; *h h*, the two pins or ledges riveted on to the foreſide of the float, and wherewith you are to fix the float to the two rings of the wheel. Theſe, or ſuch like wheels, are much uſed in Spain, Italy, and France, and are eſteemed the moſt eaſy and advantageous way of raiſing water in great quantity, to any height within the diameter of the wheel, where there is any current of water, to continue it in motion, which a ſmall ſtream will do.

"How many acres of land lie on the declining ſide of hills, by the ſides of rivers, in many places where the water cannot be brought unto it by any ordinary way? yet by this wheel placed in the river, may the land be continually watered, ſo far as is under the level of the water when raiſed."

Inſtead of raiſing the water by means of the hollow floats placed around the outer circumference of the rim of the wheel, as here deſcribed; M. Belidor propoſes, for wheels of this kind, to raiſe it in buckets placed at equal diſtances upon the ſide of the rim of the wheel, and ſuſpended by a pin, upon which they play, as at A Fig. 4. When by the rotation of the wheel, one of theſe buckets comes to B, which is the ſummit of the wheel, the upright piece D, which is faſtened to the ſide of the trough C, turns that bucket upon its ſide, and thereby makes it empty itſelf into the trough C, from whence the water is diſcharged into a receiver at E.—As theſe buckets keep full of water till they are carried up to the top of the wheel, where they are turned over, a much greater quantity of water may, undoubtedly, be raiſed by them, than can be by the floats of the Perſian wheel, from which much muſt be ſpilled as it is carrying up. The ſize of theſe buckets ſhould be adapted to the force of the current of the water which they are to take up.

Another wheel for raiſing water, though not ſo great a height, is repreſented in Fig. 4. This engine was firſt invented by M. de la Baye of the Royal Academy of Sciences at Paris, and is now uſed with great ſucceſs by the honourable Mr. Hamilton, at his ſeat at Pain's-hill in Surry, where that gentleman has ſhewn how far a barren ſpot may not only be rendered uſeful but even an ornament to the adjacent country.

This machine conſiſts of a wheel whoſe ſize is adapted to the height to which it is intended to raiſe the water. A perſpective view of this machine is repreſented Fig. 5. and its internal parts Fig. 6. The wheel turns upon its axis at A, and has ſeveral curved pipes, B, C, D, E, fixed to it, as repreſented in the figures. The mouth of each pipe aſcends as the wheel is turned round by the ſtream, in the direction indicated by an arrow, and the water deſcends from C towards F, till it reaches the hollow axis. A, A, from the opening at the end of which it is diſcharged into the trough G, and thence conducted by troughs, as H, or other channels, to whatever place it may be wanted.

But if there be a neceſſity to raiſe the water higher than the axis of the wheel, we would recommend an ingenious machine, uſed for above twenty years at Zurich, for ſupplying a large dye-houſe there with water from the Limmat, and of which a deſcription in the German language appeared in the third volume of the Zurich Acts, from whence the following account is tranſlated.

The wheel itſelf differs little in appearance from other water-wheels. Its diameter excluſive of the ladle-boards, is not quite three feet. It is coated all over with tin plates, and

and forms a ſhort cylinder, or rather drum, of the above diameter, and one foot thick. On its periphery the ladle-boards are fixed, as in other under-ſhot water-wheels, and by means of which it is put in motion by the ſtream. It turns on a hollow axis (like the laſt machine) of proportional thickneſs and length, and has one of its flat ſides applied againſt a projection, or ledge, made round the axis, to which it is preſſed cloſe, and held faſt by a wedge driven through the axis at the other ſide. That part of the axis, which paſſes through the wheel is ſquare, that the wheel may not ſlip, or be able to turn, without turning the axis with it: the remaining part of it is round. The wheel is hung in the water to about one third of its height, and ſupported in a movable frame, ſo that it can be lowered, raiſed, or even taken out of the water at pleaſure. In the periphery of the wheel are holes, by which the water enters. The axis turns as uſual, on two pivots, one of which is of braſs, conſiderably larger than the other, and hollow from end to end, communicating with the canal in the axis. The hollow pivot, which may be conſidered as a braſs pipe, has its end fitted cloſe to a leaden pipe, in which it turns. The leaden pipe, by a double bending, is confined to the wall of the dye-houſe, where it is bent perpendicularly upwards, and riſes along the wall to the height of ten feet above the axis; it is there bent again under the eaves, and continued into the dye-houſe itſelf.

The ſingular and remarkable operation of this little wheel depends ſolely on its internal ſtructure. The water entering at the circumference of the wheel, runs in a ſquare ſpiral canal, which paſſes round the wheel, and conſiſts of a number of circumvolutions, within one another, like the ſpring of a watch, till at length it comes into the axis. A neceſſary condition here is, that each of the inner circumvolutions be of the ſame magnitude with regard to their content, as the outer one; or that the width of the ſpiral canal be gradually enlarged in each circumvolution, in proportion as the diameter diminiſhes; that is, the bore of each of the inner ſpirals muſt be to the bore of the outer one, as the diameter of the latter is to the diameter of the former.

The wheel thus furniſhed with its ſpiral canal, is to be hung ſo deep in the river, that half a ſpiral, at leaſt, may, in each revolution, be filled with water. To keep it in this ſtate it would be neceſſary to immerſe it to the axis, or further: but as its motion, at ſuch a depth, would be extremely ſlow, a kind of ſcoop is made at the outer opening of the ſpiral pipe, which takes up ſo much water at once, as is ſufficient to fill the due proportion of the outermoſt ſpiral in one revolution. One half of the outer ſpiral being thus filled with water, the other half remains filled with air: as the wheel turns, the water and air paſs into the ſecond ſpiral, then into the third, fourth, and ſo on, till a ſufficient number of turns bring the water and air to the axis, from whence they paſs into the upright pipe, as already mentioned: thus the entrance and diſcharge of water continue without intermiſſion, ſo long as the wheel is kept in motion. When the wheel ſcoops up juſt the proper quantity of water, and turns with due velocity, the water may be forced up in the perpendicular pipe to a height equal to the ſum of the diameters of all the circumvolutions of the ſpiral canal.

If we conſider the operation of this machine, we ſhall eaſily ſee the neceſſity of the inner circumvolutions being made to widen in the proportion above-mentioned; and that, without this condition, the water paſſing from the large outer ſpiral, would be crouded and retarded in the inner, and in great part forced back.

It is alſo obvious that juſt half of one of the ſpirals muſt be filled with water at each revolution, for if leſs be taken in, there will be a diminution in the quantity delivered, and if more, it will be preſſed too much together, and its quantity alſo diminiſhed.

The velocity with which the wheel moves, or the number of revolutions it makes in a given time, is another eſſential point in regard to the quantity of water, and may conſiderably influence the quantity of water neceſſary to be raiſed. When this is known, and the height determined, it will be eaſy to conſtruct a wheel in ſuch a manner, as to anſwer the purpoſe intended.

We ſhall conclude our account of this ingenious contrivance, with the following directions for conſtructing it. The two flat ſides of the wheel ſhould be made of two ſtrong circular pieces of good oak, the inner ſides of which muſt be planed as ſmooth as poſſible, and fitted to one another; and to keep them from bending or warping, ſecured by pieces on the outſide. The plan of the ſpiral lines is repreſented in Fig. 7. Plate XXVII. Theſe ſpiral lines being marked out on the wood, a groove muſt be cut about a quarter of an inch deep, in order to make a channel for the partition, which muſt be formed of a thin piece of copper. The channel being filled ſomewhat more than half with good cement that will bear water, the piece of copper muſt be ſet in regularly, care being taken to keep the cement warm, or previouſly to heat the metal. The ſcoop alſo, which at every revolution of the wheel takes up a proper quantity of water from the river, may be made of the ſame metalline plate. The piece of copper for forming the partition muſt be cut at firſt exactly ſtrait, and of an equal breadth throughout. This work being finiſhed, the wheel muſt be put on the axis as far as the ledge made for it to reſt againſt, and cemented. The ſecond piece of wood requires little preparation: ſome cement muſt be ſpread all over it, and the whole ſurface covered with a thick piece of woollen cloth, which muſt alſo be done over with cement on both ſides: while the whole continues warm, it muſt be put on the axis, and preſſed cloſe to the other part of the wheel, ſo as to cover the as yet open ſide of the ſpirals. The two parts are held firm together, by means of a wedge or key paſſing through the axis, and a proper number of ſcrews, placed round the circumference: theſe ſcrews are ſtrong iron pins, ſomewhat longer than the wheel is thick, and a nut, when they are placed through the wheel, is ſcrewed on the other. Thus the inſide of the wheel, or drum is finiſhed. The diſpoſition of the ladle-boards, the ſhape of the axis, and the ſtructure of the frame by which the machine is ſupported, will be partly underſtood from what has been already ſaid, and more fully from Fig. 8. Plate XXVII.

It has been already obſerved, that the wheel in the Limmat is covered with tin plates; but this is of little or no conſequence. It is however adviſable not to have one large opening, for the entrance of the water, but either a perforated plate, or a wire-grating nailed before it, in order to prevent weeds, or any other filth from paſſing into the ſpiral tube, and preventing, if not wholly ſtopping, the courſe of the water.

The frame or ſcaffold in which the wheel hangs, and the means of raiſing or lowering it in the river, without diſturbing the courſe of the water in the machine, deſerves particular notice. It is plain from Fig. 8. that the wheel

reſt on two arms, which, for the greater ſecurity, are bound together by croſs-pieces. At the fore-end they are both ſuſpended by iron chains, which paſs over a roller ſo as to be wound off or on: on the other end they move on two ſtrong joints or hinges. The communication of the leaden pipe, with the braſs one, or hollow pivot, at the end of the axis, is drawn on a larger ſcale, in Fig. 9. This pipe is bent cloſe by the pin, to a right angle, and goes horizontally along one of the arms of the frame as far as the hinge, (ſee Fig. 8.) where it is again bent to a right angle, oppoſite to the dye-houſe, and communicates in the ſame manner as the hollow pivot of the axis, with another horizontal pipe, in which it moves round freely, without any impediment to the paſſage of the water, in raiſing or lowering the wheel. This large pipe paſſes under a ſtage built along the wall of the dye-houſe, and thence up the wall, where it diſtributes the water in the manner repreſented in the figure.

But though water is ſo neceſſary to the growth of plants, yet in lands that abound with it, there is a neceſſity for conveying it away, the beſt methods for doing which the reader will find under the articles BOG, DRAINING, MOOR, &c.

WATER-FARCY, a diſeaſe incident to horſes, and is of two kinds; one the product of a feveriſh diſpoſition terminating on the ſkin, as often happens in epidemical colds; the other is dropſical, where the water is not confined to the belly and limbs, but ſhews itſelf in ſeveral parts of the body, by ſoft ſwellings yielding to the preſſure of the finger. This laſt kind uſually proceeds from foul feeding, or from the latter graſs and fog, that often come up in great plenty with continued cold rains, and breeds a ſluggiſh viſcid blood. In the former caſe, I have ſeen the limbs and whole body enormouſly ſwelled, and very hard, the belly and ſheath greatly diſtended; which were as ſurprizingly reduced in four and twenty hours, by ſlight ſcarifications within ſide the leg and thigh, with a ſharp pen-knife, and three or four ſtrokes on the ſkin of the belly on each ſide the ſheath; from theſe ſcarifications there was a conſtant and ſurprizing large dripping of water, which ſoon relieved the horſe; when a few purges compleated his recovery.

In the other ſpecies of dropſy the curative intentions are to diſcharge the water, recover the craſis or ſtrength of the blood, and brace up the relaxed fibres throughout the whole body. To this end, purge once a week or ten days: and give intermediately either of the following drinks, or balls.

Take black hellebore freſh gathered, two pounds; waſh, bruiſe, and boil in ſix quarts of water, to four; then ſtrain out the liquor, and put two quarts of white wine on the remaining hellebore, and let it infuſe warm forty-eight hours; then ſtrain off, mix both together, and give the horſe a pint night and morning.

Take nitre two ounces, ſquills powdered, three drams, or half an ounce; camphor one dram, honey enough to form into a ball, to be given once a day alone, or waſhed down with a horn or two of the above drink.

Take of the leaves and bark of elder, of each a large handful; chamomile flowers half a handful, juniper berries bruiſed two ounces; boil in a quart of water to a pint and a half, to which add honey and nitre, of each one ounce.

Give this drink every night, or night and morning; and to compleat the cure, and ſtrengthen the whole body, give a pint of the ſubſequent infuſion every night and morning, for a fortnight, faſting two hours after it.

Take gentian root and zedoary, of each four ounces; chamomile flowers and the tops of centaury, of each two handfuls; Jeſuits bark powdered two ounces; juniper berries four ounces; filings of iron, half a pound: infuſe in two gallons of ale for a week, ſhaking now and then the veſſel.

Before we cloſe this article, we think proper to lay down the ſymptoms of an incurable farcy, that the owners of ſuch horſes may ſave themſelves unneceſſary expence and trouble in their endeavours to obtain a cure.

When a farcy by improper applications, or by neglect has ſpread or increaſed; or after long continuance reſiſted the medicines above recommended; if freſh buds are continually ſprouting forth, while the old ones remain foul and ill-conditioned; if they riſe on the ſpines of the back and loins; if the horſe grows hide-bound, and runs at the noſe; if abſceſſes are formed in the fleſhy parts between the interſtices of the large muſcles; if his eyes look dead and lifeleſs; if he forſakes his food and ſcours often, and his excrements appear thin, and of a blackiſh colour; if the plate, or thigh vein continue large after firing, and other proper applications: theſe ſymptoms denote the diſtemper to have penetrated internally, and that it will degenerate into an incurable conſumption: it is alſo moſt probable, that the whole maſs of fluids are tainted, and become incurable by art. *Bartlet's Farriery, page* 193.

WATTLE, a kind of hurdle formed with ſplit wood, and uſed for making folds for ſheep.

WAX, *or* BEES-WAX, a ſubſtance formed by bees from the farina of flowers. *See the article* BEE.

WAY-BREAD, plantain.

WEANEL, an animal newly weaned.

WEED, any plant growing in a field different from what the farmer intended.

There is not a field where we do not find ſome of theſe; they grow in the greateſt plenty on the richeſt ſoils.

Weeds will appear impediments to vegetation, if we conſider the following particulars.

They rob the plants we deſire to cultivate of their food; they prevent theſe plants from branching out from the root, and they leſſen the vegetable paſture in the land where they are ſuffered to grow.

Weeds are nouriſhed by the ſame food that would nouriſh uſeful plants; and therefore, when allowed to grow along with them, muſt rob them of part of their food. Although it is allowed, that the food of all plants is not exactly of the ſame kind; yet as plants ſuck in whatever juices, or ſmall particles of matter are touched by their roots, it may be juſtly ſaid, that all kinds deprive the earth of that vegetable food which would nouriſh others.

Experience convinces the farmer of the truth of this: for he finds, that his crop is bad in proportion to the quantity and kinds of weeds with which his land is infeſted.

Weeds cover the ſurface of the land on which they grow, and thereby, confining the plants we deſire to cultivate, prevent

prevent them from branching out from the root. For all plants, when confined by others at their ſides, inſtead of branching out, as ſome of them are inclined to do, make vigorous efforts to get above thoſe by whom they are confined.

Some perſons have attempted to ſhow, that corn never wants room to grow; and that it is the want of food alone which makes ſome plants decay, when they are ſet too thick. If this is true, weeds can do no harm to plants, by covering the ſurface, and confining them while they grow. But let a perſon caſt his eyes upon a plantation of any kind, and he will immediately obſerve, that where the plants are placed very near to each other, they ſtretch out chiefly to the length; and where they are placed at a greater diſtance, they grow not ſo much to the length, but more to the thickneſs, and branch out on all ſides. So that the proportion of nouriſhment which the plants receive, makes them grow either to the length principally, or to the thickneſs, and branch out, according as they are placed near, or at a diſtance from each other. The ſame thing happens, when there are many weeds growing amongſt corn. Some fields are ſo much infeſted with weeds, that, though nō grain is ſown, the plants come up very thick. This obliges the farmer to give plenty of ſeed: in conſequence of which the ſurface is quite covered; and the plants of corn being confined by the weeds, inſtead of branching out from the root, and producing two or more ſtalks, as they are naturally diſpoſed to do, puſh up one ſtalk only, that ſo they may the more eaſily get above their rivals. The proportion of nouriſhment which they receive, makes them grow to the length, inſtead of branching out from the roots; makes them produce one ſtalk and ear only, inſtead of many. Experience confirms the truth of this. When land is rich, and at the ſame time much infeſted with weeds, the plants of corn grow tall enough; but ſeldom have more than one ſtalk.

Some kinds of weeds have great numbers of ſmall roots, which they extend to a great diſtance. Theſe roots bind the ſoil in ſuch a manner, as to leſſen the vegetable paſture; or rather make it very difficult to enlarge it by tillage. It may be obſerved, that when a field is much infeſted with quickening graſs, the ſoil is ſo firmly bound together by the roots, that it is not poſſible to pulverize it. When ploughed, the earth of the furrow is turned over whole, and the harrows ſcarcely make any impreſſion upon it.

It is of great importance, therefore, to know how to deſtroy theſe uſeleſs and noxious plants, that ſo all the vegetable food in the ſoil may be applied to the nouriſhment of the uſeful plants we deſire to cultivate; that theſe uſeful plants may have room to extend themſelves, and branch from the root on all ſides; and that the vegetable paſture, which, by the rain that falls, and the natural weight of the ſoil, is always leſſening, may be the more eaſily enlarged.

Different Kinds of Weeds.

Plants are commonly divided into two ſorts; annuals, that is, ſuch as in one year come to perfection, carry ſeed, and die; and perennials, that is, ſuch as continue in life for more years than one. Annual plants are almoſt all propagated by the ſeed. Perennials are propagated, ſome by the ſeed, others by the root, and a third ſort both by the ſeed and root.

Weeds may be divided in the ſame manner, into annuals and perennials. But, intreating of the methods of deſtroying them, we ſhall be better underſtood, if they are divided into theſe two ſorts; weeds that are propagated by the ſeed, and weeds that are propagated by the root. It is needleſs to conſider the weeds that are propagated both by the ſeed and the root, as a third ſort. For when their ſeeds infeſt the land, they muſt be treated as weeds that are propagated by the ſeed; and, when their roots infeſt the land, they muſt be treated as weeds that are propagated by the root. It is neceſſary, however, to divide weeds into theſe two ſorts, into which we have divided them: for, in ſome caſes, that kind of management proper for diſcouraging the one ſort, tends to encourage the growth of the other.

But, beſides theſe two ſorts of weeds mentioned, it will not be improper that we likewiſe take notice of thoſe ſhrubs by which ſome land is greatly infeſted. Theſe, though they are not commonly reckoned in the claſs of weeds, and though ſome of them may have their particular uſes; yet, as they are plants different from what the farmer deſires to cultivate in his fields, they fall under the definition which we have given of weeds, and ſhall be reckoned by us a third claſs.

Methods of deſtroying Weeds.

The deſtroying of weeds is certainly one of the moſt important parts of agriculture. By allowing them to grow, we allow the land, as was formerly obſerved, to be robbed of its vegetable food, and its vegetable paſture to be greatly leſſened.

It may be inquired, what becomes of this vegetable food of which they rob the land? It is either conveyed to the air, and ſent to enrich other land, or it is turned into a form that renders it deſtructive.

When weeds wither and putrefy above ground, the ſalts and oils which they contain, and of which they deprived the land on which they grew, become volatile, and fly off into the air, and leave little more than their earth remaining.

When weeds carry ſeed, and ſhed it upon the land, and when the roots, by the nouriſhment they receive, are enlarged and extended; the vegetable food, of which they have deprived the land, is turned into a form that renders it deſtructive, into ſeeds and roots, by which the land is further exhauſted.

The ſeeds and roots of weeds, though deſtructive to uſeful plants, by robbing them of their food, yet they contain vegetable food in themſelves; and, when the ſeeds are picked up by birds, and the roots eaten by animals, the vegetable food is carried off. But, if theſe weeds are deſtroyed, and reduced to a ſtate of corruption, the vegetable food, which they have taken from the land, and rendered deſtructive, is reſtored to it, and becomes beneficial: ſo that land that is poor, and unfit for carrying crops of uſeful plants, by being full of weeds, may be made rich and fertile, by deſtroying them.

From theſe things it appears, that the deſtroying of weeds is one of the moſt important parts of agriculture. As it is important, ſo likewiſe it is difficult.

There is ſcarcely a field, in which we may not obſerve weeds of the two firſt kinds mentioned; of the kind that is propagated by the ſeed, and the kind that is propagated by the root. Some of theſe, perhaps, it may be eaſy to deſtroy, as they are foreigners, and not adapted to the ſoil;

but

but others of them being natural to the ſoil, in that kind of it that is moſt proper for them, it may be expected, not only that it will be very difficult to deſtroy them, but alſo, that, by the culture given to the land, they will thrive wonderfully, carry great crops of ſeed, multiply, and extend their roots. As the deſtruction of weeds is then ſo important and difficult, it is a work that muſt be particularly attended to.

Weeds have been divided into three ſorts. To deſtroy theſe different ſorts, different management is required. It is neceſſary therefore to treat of them ſeparately.

Methods of deſtroying Weeds that are propagated by the Seed.

Weeds are very different in their natures. The ſeeds of ſome of them will putrefy in a few years, if they lie moiſt in the earth, and are prevented from vegetating. But the ſeeds of others will lie many years in this ſituation, without having their vegetative power deſtroyed. This we know from experience. Land infeſted with different kinds of weeds, has been frequently thrown out into graſs, and allowed to remain in that ſituation for ſome years. Though allowed to lie only a few years, ſome kinds of weeds are found to be deſtroyed, when the land is broke up again; but, though it lie twenty years, ſome other kinds are found in as great plenty as before.

The firſt ſort may be deſtroyed by turning the land infeſted with them, from tillage into graſs, and allowing it to remain in that ſituation for five or ſix years.

Both ſorts may be deſtroyed by bringing the ſeeds to vegetate, and then tearing up the young plants. Seeds will not vegetate without air. Some require a greater proportion, and ſome a ſmaller. The ſmall ſeeds will not vegetate without a very great proportion of it. It may be obſerved, in fallowing land which is full of weeds, that great numbers of them appear after every ploughing. This ſhows, that ſome of the ſeeds had not a ſufficient quantity of air, in their former ſituation, to make them vegetate. Now, to give theſe ſmall ſeeds the proportion of air neceſſary for them, they muſt be brought near the ſurface, and the earth about them rendered free and open. If the land is frequently ſtirred and turned over, both theſe will be done. For every time the land is ſtirred and turned over, ſome ſeeds, that before lay deep, are brought near the ſurface, and the earth about them alſo rendered free and open: and, beſides, the plants that have appeared are thereby torn up and deſtroyed.

Every farmer that practiſes ſummer-fallowing, is now fully convinced of the truth of this. For he obſerves, when the ſeaſon is favourable, and his fallow is well and frequently ploughed and harrowed, and time allowed betwixt every ploughing and harrowing for the weeds to vegetate, that his land, for ſeveral years, is not ſo much infeſted with weeds as before.

It has been obſerved, that ſeeds will not vegetate without air, and that to give the ſmaller kinds the quantity which they require, they muſt be brought near the ſurface, and the earth around them rendered free and open. It is neceſſary likewiſe to obſerve, that water is as requiſite to promote vegetation as air; and that the bringing ſeeds near the ſurface, and rendering the earth free and open around them, as it ſupplies them with air, tends to deprive them of water. In the performance, therefore, of thoſe operations by which the land is ſtirred and turned over, to promote the vegetation of the ſmall ſeeds, great care muſt be taken to preſerve the ſap, as much as is poſſible. This will be done, if, in ſtirring the land, the ſurface is made ſmooth and plain. It is obvious, that, when the ſurface is rough and uneven, the drought has eaſy acceſs; but, when it is ſmooth and plain, the winds have leſs influence, and the ſap is better preſerved. Every farmer will obſerve, that, in dry weather, when land is allowed to lie ſome time after it has been ploughed, without being harrowed, the drought has eaſy acceſs, the ſap is exhaled, and the ſeeds in it, though near the ſurface, and the earth around them free and open; yet, being deprived of water, are prevented from vegetating: whereas, when the land is harrowed immediately after it is ploughed, the ſap is preſerved, and the ſeeds ſpring up. Hence the cuſtom of ſowing barley immediately after the plough. Barley is commonly ſown in a dry ſeaſon; and therefore the land is not allowed to lie long after it is ploughed, leſt the ſap ſhould be exhaled; but is immediately ſown and harrowed, by which the ſap is preſerved.

The vegetation of ſeeds in land is promoted, not only by ſtirring and turning over the land, but alſo by the application of dung and ſome other manures. Dung raiſes a fermentation; this opens the pores of the ſoil, allows the air to reach the ſeeds, and gives them liberty to put forth their roots. If dung, therefore, is laid upon land infeſted with weeds, and the land carefully ſtirred and turned over ſeveral times, all the ſeeds in it, by degrees, will be brought to vegetate; and thus the weeds will be deſtroyed.

It muſt be owned, that this practice, though proper for deſtroying weeds, may, in ſome caſes, deſtroy ſome of the virtues of the dung, before it is applied to promote the vegetation of the uſeful plants we deſign to cultivate. Dung promotes vegetation, by producing a fermentation in the ſoil upon which it is laid; and, by this fermentation, ſeparating its particles. If this fermentation is, in a great meaſure, over before ſeed is ſown, the natural weight of the ſoil, making it ſubſide, will render the vegetable paſture, while the plants are growing, much leſs than it would have been, if the dung had not been ſo ſoon laid on; and more harm may be done by this, than advantage gained by deſtroying the weeds. But, though it may be improper to follow this method, when ſeed cannot be ſown for a conſiderable time after the dung is laid on, as is the caſe ſometimes when ſummer-barley is ſown on fallow, yet it may anſwer very well, when ſeed is to be ſown ſoon after, as is the caſe when wheat is ſown. The advantages ariſing from the deſtruction of the weeds, though not in the firſt caſe, yet in the laſt, may probably do more than overbalance the loſs ariſing from ſome part of the ſtrength of the dung being exhauſted before ſeed is ſown.

It may, perhaps, be thought a little ſurpriſing, that dung ſhould be propoſed as a means of deſtroying weeds, when it is univerſally conſidered as a great encourager of them. It is certain, that the laying dung upon land makes more weeds appear, than otherwiſe would do. If the ſeeds of theſe weeds are in the dung, it muſt be owned, that it increaſes, and not diminiſhes their number. But, if the ſeeds are in the land, and the dung only makes them vegetate, it becomes a proper means of deſtroying them.

It ſeems to be the general opinion, that the great plenty of weeds that appear on land after it is dunged, are produced from ſeeds mixed with the dung. But there are ſome reaſons to believe that this is a miſtake.

It is to be obſerved, that dung produces weeds, when it is taken from a dung-hill, ſo much heated as to deſtroy the vegetative power of any ſeed.

It is obſerved likewiſe, that the ſame dung produces weeds, according to the nature of the land on which it is laid. It often happens, that dung carried ftom a town is laid upon different ſoils; and it is certain, that this dung does not produce the ſame kind of weeds on all ſoils, which it would do, if the weeds aroſe from ſeeds, mixed with it: but always produces the weeds, with which the ſoil upon which it is laid is naturally infeſted.

Theſe obſervations make it very probable, that the great quantity of weeds produced by dung, is entirely owing to the fermentarion occaſioned by the dung; by which almoſt all the ſeeds near the ſurface, receiving a proper quantity of air, are thereby brought to vegetate.

To this it may be objected, that ſuch numbers of weeds do not appear upon land that is new marled, as upon land that is dunged. But, in anſwer to this, let it be obſerved, that a great quantity of marle is laid on, and in large pieces, and that it is ploughed in with a ſhallow furrow: and therefore, though a fermentation may be raiſed, yet the undiſſolved marle prevents a great part of the ſoil from being expoſed to the air, in ſuch a manner as to make the ſeeds in it vegetate; and alſo occaſions ſuch a hollowneſs, that, after the ſeeds begin to vegetate, ſuch of the plants as are tender (and ſeveral ſorts of them are not ſo hardy as corn) are eaſily deſtroyed by drought or froſt.

Before we leave this article, it is neceſſary to obſerve, that the ſeeds of ſome weeds, particularly the different ſpecies of the thiſtle, are carried to a conſiderable diſtance by the wind; and where any earth is thrown up in ſuch a manner as to intangle them, as at the root of a hedge, or ſide of a ditch, there they appear in great plenty. It is ſurpriſing, that many farmers allow them to grow there undiſturbed: the conſequence of which is, that their ſeeds are carried in great plenty into the adjacent fields, and thereby great damage is done; which might have been prevented by cutting them down, at a ſmall expence, before their ſeeds were ripened.

Methods of deſtroying weeds that are propagated by the root.

There are many different kinds of weeds propagated by the root, and theſe of very different natures. Some of them infeſt the land that is in tillage, and others the land that is in graſs. Any perſon may ſatisfy himſelf of this, by inſpecting our fields. The farmer is very ſenſible of it: he knows that ſome kinds of weeds flouriſh and increaſe in his land, while in tillage, if he does not take all pains todiſcourage them: and when he lays down his land in graſs, other kinds that do not appear before, ſoon diſcover themſelves; and, if undiſturbed, continue to increaſe, while the land remains in that ſituation.

The firſt ſort, it ſeems, have ſuch a tender blade, and ſuch tender roots, that they cannot pierce earth that is hard; but are of a kind that increaſe very faſt, when the ſoil is free and open.

The ſecond ſort have the blade and roots ſo ſtrong, that there is ſcarcely any ſoil that, ofitſelf, will become ſo hard and ſtiff, as to prevent them from making their way through it; but are of ſuch a nature, as to be eaſily torn up, when the land is free and open; and do not eaſily ſtrike root again when torn up.

The natures of theſe weeds point out methods of deſtroying them.

The firſt ſort, as they chiefly infeſt land in tillage, may be deſtroyed by turning the land from tillage into graſs, and allowing it to remain for ſome years in that ſituation. This is confirmed by experience. Land over-run with quickening-graſs, and other root-weeds of the ſame kind, is frequently laid down in graſs, and allowed to continue for ſome years without being ploughed. This land, when broke up again, if allowed to lie in graſs for ſix or ſeven years, is found to be clean, and the roots of the weeds deſtroyed.

The number of years neceſſary for deſtroying the roots, depends upon the nature of the ſoil. If the ſoil is naturally hard and ſtiff, it is the ſooner brought to ſuch a ſituation, as to prevent the roots and blades of the weeds from piercing it. But, if it is naturally ſoft and ſpungy, it takes a longer time before it is brought to that ſituation. For while the blade, or roots of the weed, can pierce the ſoil, their vegetation is not prevented. In ſome ſoils it is ſix or ſeven years before the roots of the quickening-graſs are deſtroyed.

The number of years found neceſſary for deſtroying theſe root-weeds, has, no doubt, been partly the occaſion of eſtabliſhing the practice commonly obſerved. Three crops of corn are taken, and then the land is allowed to lie ſix years in graſs, or lea. At the end of theſe, the farmer ſuppoſes that the lea is come to maturity, and fit again for being ploughed. When it is only two or three years old, it is called, in ſome parts of the country, calf-lea; and, if ploughed at that age, is commonly very full of roots.

The ſowing land with graſs-ſeeds, inſtead of turning it out into lea, deſtroys the roots of theſe weeds ſome years ſooner. For thereby a ſward being brought immediately upon the ſurface, the land becomes firm, the blades of the weeds are unable to pierce it, and the roots are deprived of air. Ryegraſs-ſeed, or the common hay-ſeed, is the moſt proper for this. For the plants ariſing from theſe, ſoon cover the ſurface, and, by the number and ſmallneſs of their roots, bind the ſoil. Clover, particularly the broad clover, is improper; for the roots of it being large, they open the ſoil in growing and extending themſelves, and thereby prevent it from arriving at that degree of firmneſs, neceſſary for deſtroying the weeds ſo ſoon, as if no graſs-ſeeds are ſown, but the land immediately turned into lea.

The ſecond ſort may be deſtroyed by turning the land infeſted with them, from graſs into tillage; and it is not neceſſary to continue it long in this ſituation, for the weeds commonly diſappear after the firſt ploughing.

But as it may be inconvenient to turn a field infeſted with weeds, from graſs into tillage, or from tillage into graſs; it is neceſſary to conſider, if there are any methods of deſtroying theſe weeds, without altering the ſituation of the land.

When land in tillage is infeſted with weeds, they may be deſtroyed by frequently ſtirring and turning it over in dry weather. For the weeds being removed out of their place, the drought prevents tnem from ſtriking root again. The ſtirring the land in wet weather, is rather hurtful than beneficial: for though the roots of the weeds are removed from their place, yet the weeds themſelves are only tranſplanted. If the land is wet, they ſoon ſtrike root again; and the quickening-graſs, in particular having its paſture enlarged, makes quicker progreſs than

ever. But, if the land is dry, the weeds do not ſo eaſily ſtrike root again: or, if ſome of them ſhould ſtrike root, they continue for ſome time in a languiſhing condition, and if removed out of their place, while in this condition, are eaſily deſtroyed by the drought. If land then is frequently ſtirred and turned over, by degrees all the weeds will be deſtroyed: for, by every ſtirring or ploughing, ſuch of them as are in a languiſhing condition are deſtroyed, while thoſe that are ſtrong and vigorous are weakened.

When land is to be freed from ſeed-weeds, it cannot be made too fine, nor the ſurface too ſmooth; for the more perfectly theſe are done, the greater number of ſeeds are brought to vegetate. But, when land is to be freed from root-weeds, it cannot be turned up in too large pieces, nor the ſurface left too rough: for the larger the pieces, and the rougher the ſurface, the drought has the eaſier acceſs, and the roots are the more effectually deſtroyed.

When land in graſs is infeſted with weeds, and it is inconvenient to turn it into tillage, the weeds themſelves muſt be pulled up by the root, or frequently cut: which are the only ways of deſtroying them.

Some perſons aſſert, that ſheep are very fond of the yellow rag-weed, by which light land, when laid out in graſs, is very much infeſted. If this is true, the putting ſheep to paſture upon this graſs, for a ſeaſon or two, will effectually deſtroy this weed. This may be the more ſafely recommended, as the trial, though it does not ſucceed, cannot be attended with any danger or loſs.

Some land, after being a few years in graſs, is liable to be over-run with fog. This, it is ſuppoſed, is owing to the ſoil becoming ſoft and ſpungy near the ſurface. If this is the caſe, rolling, which makes the ſurface firm, will be of ſome uſe to deſtroy this pernicious weed. It may be obſerved, that, when there is a foot path through a graſs-field over-run with fog, not ſo much frequented as to break the turf, the graſs upon the path is clean, without any mixture of fog.

There is a third ſort of weeds found to infeſt both the land that is in tillage, and the land that is in graſs. This ſort have not only the blade and roots very ſtrong, ſo as to be able to pierce the ſoil, though hard, but alſo are of ſuch a nature, as makes it difficult to tear them up; or have their roots of ſuch a kind, that they may be divided into a great number of plants.

Theſe weeds cannot be deſtroyed, either by turning the land infeſted with them, from tillage into graſs, or from graſs into tillage: but they may be deſtroyed by the methods mentioned, when the ſituation of the land is not changed. If the land is in graſs, they may be deſtroyed by digging them out, or by frequently cutting them. And, if the land is in tillage, they may be deſtroyed by frequently ſtirring and turning it over in dry weather. This work muſt be performed with ploughs properly made for cutting their roots. This kind of weeds puſh their roots very far down, and their roots are ſo tough and hard, that our common ploughs ſeldom break them. If there are any ſtones in the land, they puſh their roots among the ſtones; and, in ſuch places, the plough not having freedom to act, they continue undiſturbed. In this land too the plough, moſt proper for cutting theſe roots, cannot go with ſafety. But if the ſtones are dug out, and the land ploughed with a broad pointed ſhare, the roots, by degrees, will be cut, and the weeds deſtroyed.

Beſides theſe three ſorts of weeds mentioned, there is a fourth that chiefly infeſts land that is wet. Frequent cutting, and even digging out by the root, have been tried to deſtroy them, but to no purpoſe. They are not to be ſeen on dry land, and, when on land only inclining to be wet, appear very weak. This points out draining to be the proper method of deſtroying them, which indeed does it effectually.

We ſhall now conclude this article with obſerving, that all kinds of root-weeds, and many kinds of the ſeeds of weeds, may be deſtroyed by depriving them of air. For air is neceſſary not only to the vegetation, but alſo to the life of every plant.

When land is in tillage, the weeds may be deprived of air, either by burying them deep in the earth, or covering the ſurface. Trenching does the one, and a good crop of peas, potatoes, or any other plants that lie thick on the ſurface, does the other.

Fog, by which ſome lands in graſs are much infeſted, may be deſtroyed in the ſame manner. The method propoſed is this: the graſs muſt be kept from the month of March to the month of December, for winter-paſturing, and the next ſeaſon preſerved for a crop of hay. The fog being, by this management, covered for two ſeaſons by the graſs, is thereby deſtroyed.

As different methods are neceſſary in the extirpation of different weeds, and it is of ſome importance to know which of them are perennial, and which only annual, we have added a liſt of the moſt remarkable weeds which infeſt the arable and graſs lands in England, ranged according to their duration. A pomp of names is carefully avoided, and thoſe which Mr. Hudſon has given in his Flora Anglica are choſen: it is a misfortune that many farmers will not know what plants are meant by ſome of theſe names; but it is a misfortune ſcarcely to be avoided, ſince the Engliſh names of vulgar plants are ſo various, altering not only with the county, but with the place, and even ſometimes depending on the whim of a common labourer.

By far the greater number of annual weeds infeſt the arable lands: in graſs lands the perennials chiefly flouriſh. The reaſon is obvious; in the former the roots are continually deſtroyed by cutting; in the latter they are made to ſpread by cutting or eating down the ſtems: perennials uſually require more than a year to come to perfection; and the ſeeds by which annuals are propagated, are not ſo readily received into the more compact turf, as into land whoſe parts are conſtantly undergoing a ſeparation.

The annual weeds which infeſt arable lands and gardens are chiefly theſe,

Ivy-leaved ſpeedwell, or ſmall henbit. April.
Annual darnel-graſs.
Bearded oat-graſs, bearded wild oats, or haver.
Little field-madder. May.
Cleavers, or gooſe-graſs. May.
Parſley-piert. May.
Pearl-wort, or chickweed breakſtone. This ſmall weed is very apt to infeſt gravel-walks; and if it be ſuffered to ſeed, will increaſe prodigiouſly, and grow very troubleſome. June.
Baſtard alkanet. May.
Small wild bugloſs. June.
Male pimpernel. May.
Venus's looking-glaſs, or codded corn-violet. June.
Dodder,

Dodder, hell-weed, devil's-guts, or ſcald. July.
This is found chiefly on beans; it ſtrangles the crop, and draws its nouriſhment from the plants about which it entwines itſelf. It infeſts alſo hops and flax.
Small corn-parſley. Auguſt.
Gooſefoot of ſeveral kinds flouriſhes on dunghills, and is often ſuffered by the farmers to grow there unmoleſted, by which the dung is much exhauſted. Auguſt.
Fool's parſley. This is generally allowed to be a ſtrong poiſon, and is very common in gardens.
Shepherd's needle, or Venus's comb. June.
Common chickweed. The peſt of gardens.
Knot-graſs. This plant is remarkably full of ſeed, and propagates itſelf ſurpriſingly: it will grow any where, particularly in places that are much trodden. The ſparrows, and other ſmall birds, are very fond of its ſeeds. June.
Black bindweed. June.
German knot-graſs, or annual knawel. Auguſt.
Purple-flowered chickweed, or ſpurrey; on ſandy lands. June.
Cockle. June.
Corn ſpurrey. Auguſt.
Petty-ſpurge. July.
Sun-ſpurge, or wart-wort. Theſe are both very common in gardens. July.
Red-poppy, or corn-poppy. June.
Wild larkſpur. This has increaſed ſo much of late years in Cambridgeſhire, as to become one of the common weeds among the corn.
Adonis flower, pheaſant's eye, red maithes, red Morocco. Frequent in the corn-fields of Kent.
Corn crowfoot. The ſeeds of this do not come forth till the ſecond year after ſowing. June.
Upright ground-ivy.
Red archangel, or dead-nettle. Common in gardens.
Great henbit.
Narrow-leaved all-heal.
Nettle-hemp, or hemp-leved dead nettle.
Red eye-bright.
Fluellin; ſharp-pointed, and round-pointed.
Gold of pleaſure; among the flax. June.
Shepherd's purſe.
White-flowered charlock, with a jointed cod. June.
Yellow-flowered ditto.
Wild muſtard, or charlock. May.
Theſe three, particularly the laſt, are the *opprobium* of the farmers: they who will not be at the pains to extirpate them by hand, might do well at leaſt to run a ſcythe over the crops, while the weed is in flower, and before their ſpring corn (for it is that which is chiefly troubled with it) is got up too high.
Fumitory. April.
Yellow vetchling; very common in the corn-fields about Cambridge.
Common ſow-thiſtle. June.
Common groundſel.
Corn-marigold; the peſt of light lands; it is not fond of dung. In Denmark there are laws for the extirpation of this weed. June.
Common camomile, or corn-feverfew. June.
Stinking May-weed. June; ſomewhat earlier than laſt.
Blue-bottles. July.
Panſies, or heart's-eaſe.
Leſſer nettle. Auguſt.
Oracee, of ſeveral kinds; along with the gooſefoot, on dunghills, and in Gardens. Auguſt.

Annual weeds in paſture grounds are only the following.

Purging-flax. May.
Knot-graſs. This ſpreads chiefly by the path ſides, and where dung or rubbiſh has lain.
Yellow rattle, or cock's-comb, vulgarly penny-graſs; in moiſt meadows. This keeps its ground, for the ſeeds are ripe at the time of cutting hay. June.
Eye-bright; in dry paſtures.
Red eye-bright.
Heart-trefoil, or clover. This is always mixed with clover, and particularly with the hop-trefoil, or non-ſuch. It is a harſher plant, full of hard, prickly ſeed-veſſels, and therefore not a good food for cattle: it is eaſily known from other clovers, by its ſeed-veſſels, and the ſpots upon its leaves.
Common creeping mouſe-ear. May.
Smooth ſuccory hawk-weed. June.
Star-thiſtle; in dry barren paſtures, and by way ſides. July.
Hairy ſheep's ſcabious; on high paſture.

Biennial weeds in corn.

Viper's bugloſs, called in Cambridgeſhire, &c. cat's tail. It infeſts the corn very much every third year. July.
Mithridate-muſtard, or baſtard creſs.
Common melilot. The ſeeds of this ground along with wheat, are known to give bread a very ſtrong taſte. June.
Spear-thiſtle. July. This with many other kinds of thiſtles and other weeds, with downy ſeeds, are ſuffered to ſtand on banks, way-ſides, and fallow lands, in order to ſerve for a conſtant ſupply of weeds. If the waſte places were run over with an old ſcythe, this evil would ſoon be prevented.

Biennial weeds in paſtures.

Wild-carrot, or bird's neſt. June.
Cow-parſnip. July
Common-mallow. May.
Rough-ſuccory hawk-weed. July.
Stinking hawk-weed. June.
Muſk-thiſtle. July.
Wild carline-thiſtle. June.

Perennial weeds in corn.

Field fox-tail, or mouſe-tail-graſs.
Common wheat-graſs, dog's-graſs, quick-graſs, or couch-graſs. As every piece of this moſt deteſtable creeping weed will grow, there is no way of deſtroying it, but by ploughing up the ground thoroughly, picking it out, and burning it.
Common field-ſcabious. Auguſt.
Small bind-weed. This ſpreads its roots deep and wide; and as every piece of them will grow, it is no eaſy matter to eradicate this pernicious plant.

Bladder-campion, white corn-campion, ſpattling-poppy. July.

White-campion. May.

Small-bramble, or dewberry-buſh. June.

Corn-mint. Auguſt.

White-archangel, or dead-nettle; chiefly in gardens and under hedges.

Corn reſt-harrow, or cammock. The roots of this mat together with great ſtrength, and are therefore very troubleſome, where land is to be ploughed for corn. This property, however, makes it an excellent plant to ſet on ſea and fen banks, to keep them firm and compact. July.

Tree ſow-thiſtle. Auguſt.

Way-thiſtle. The fallows are uſually well overſpread with this weed, whoſe downy ſeeds are eaſily ſpread by the wind. July.

Great knap-weed, or matfellon. Its roots are very ſtubborn and hard. July.

Corn horſe-tail.

Perennial weeds in paſtures.

Devil's-bit. June.

Great-plantain, or waybread. June.

Ribwort, or ribwort-plantain. June.

Yellow ladies bed-ſtraw, or cheeſe-renning. It is a vulgar notion, but a falſe one, that this herb will turn milk. The good women are fond of putting ſome favourite plant into their rennet, and thus attribute to it a quality which it has no right to claim. July.

Cowſlips, or pagils. April.

Round-leaved bell-flower. Auguſt.

Leſſer throat-wort, or Canterbury-bells. July.

Meadow-ſaxifrage. Auguſt.

Burnet-ſaxifrage. Auguſt.

Crow-garlic. This gives milk and butter an inſufferable ſtrong taſte. June.

Broad-leaved dock. July.

Common-ſorrel. May.

Sheep's ſorrel.

White ſaxifrage, or ſengreen. May.

Agrimony. June.

Drop-wort. Hogs are fond of the roots. July.

Meadow-ſweet. June. Only in very moiſt meadows. Goats are very greedy of this plant, which neither horſes nor kine will touch.

Tormentil, or ſeptfoil. June.

Creeping-crowfoot, or butter-cups. May.

Bulboſe-crowfoot, or butter-cups. May.

Upright meadow-crowfoot. June.

The three laſt, which occupy ſo much room in almoſt all meadows, are not eaten by any ſort of cattle, being of a very hot and acrid nature, ſo that the notion of their giving butter a yellow tincture, is as falſe as it is vulgar.

Pilewort, or leſſer celandine. April.

Meadow-rue. June.

Bugle. May.

Self-heal. Auguſt.

Common yellow toad-flax. July.

Common ladies-ſmock, or cuckow-flower. April.

Crowfoot craneſbill. June.

Common broom: in dry paſtures. May.

Reſt-harrow, or cammock; in barren grounds.

Dandelion. April.

Rough dandelion. May.

Yellow devil's bit. Auguſt.

Long-rooted hawk-weed. May.

Dwarf carline-thiſtle. July.

Common coltsfoot; in watery days. March.

Common butter-bur; in moiſt meadows. March.

Ragwort, or ſeagrim. Nothing touches this plant; though a perennial, it comes up eaſily by hand, when young, or when the ground is moiſt. July.

Fleabane; in moiſt places. Auguſt.

Common daiſie. We do not find that any cattle willingly eat of this plant, which occupies ſo large a part of our paſtures.

Greater daiſie, or ox-eye. May.

Common yarrow, or milfoil. The roots of this creep abominably, eſpecially where rubbiſh, or dung has been laid. May.

Common knap-weed, or matfellon. July.

Orchiſes of various ſorts; as,

In moiſt meadows.
- Butterfly orchis. May.
- Male fool-ſtones. May.
- Female fool-ſtones. May.
- Male-handed orchis. May.
- Female handed orchis. June.
- Red-handed orchis. June.

In dry paſtures, chiefly in chalk.
- Purple late-flowering orchis. June.
- Little purple-flowered orchis. May.
- Man orchis. June.
- Frog ſatyrion. May.
- Triple ladies traces. Auguſt.
- Bee orchis. June.

Carexes of various ſorts; in low meadows and fenny grounds. Theſe are all very harſh: they are, however, mowed to fodder cows with in winter.

Common nettle.

Adder's tongue; in moiſt meadows.

Female fern, or brakes; on dry barren land. It ſtrikes its roots far and wide, and is difficult to eradicate even with the plough.

Moſſes of various ſorts. Old paſtures are moſt infeſted with theſe. Ploughing is the only effectual way of deſtroying them.

We have added the time in which moſt of the foregoing plants begin to flower; becauſe about that time it is proper they ſhould be deſtroyed.

Though the reader will find an account of many of the weeds enumerated in the above catalogue, under their proper articles, yet we were perſuaded that a general deſcription of the perennial weeds would not be unacceptible here, as too much cannot be ſaid to enable the huſbandman to know theſe pernicious plants, and exterminate them as ſoon as poſſible.

Annual darnel-graſs is called white darnel by Gerard, and in the ſouthern counties crap; though, in Worceſterſhire, they call the buck-wheat by this name. It was a ridiculous old notion, that this weed, which has ever been ſtigmatized as one of the greateſt peſts of corn, is produced from bad ſeed of wheat. The French call it *yvraie*; becauſe, put into bread, or beer, it is ſuppoſed to cauſe drunkenneſs. It has always been reckoned bad for the eyes, and to occaſion vertigoes. This plant is very like the red darnel-graſs, which has been ſo much cultivated, under the name of ray-graſs, or vulgarly rie-graſs: but the ſpike is much larger and paler; and has beards, which the ray-graſs is entirely without. It is likewiſe annual: whereas

whereas the ray graſs has an abiding root. Its ſeeds ripen with the corn.

Bearded oat-graſs, or wild oats, is very like the common oat in appearance, but generally over-tops it. The ſeeds are alſo of a duſky reddiſh colour, and hairy towards the bottom. The beards or awns are very long, ſtiff, and bent. As it ripens with the corn, or but little before it, the extirpation of it is not very eaſy.

Baſtard alkanet is called, alſo, baſtard gromill, or gromwell, and falfern. Nothing is more common among the corn, eſpecially among rye, than this weed. It may eaſily be known, by its red roots, which yield a red tincture, and are uſed by the country girls in Sweden, to ſmear their faces with. From the root uſually riſes a ſingle ſtem, about a foot high, rough, and branching out at the top. The flowers are ſmall and white, ſurrounded with five long, narrow, hairy leaves, and ſucceeded by four white rough ſeeds.

The dodder is ſo remarkable a plant, that it cannot be miſtaken by thoſe who know the name. It is entirely without leaves, and does not depend upon the ground for nouriſhment; but when it is grown up, rots at the bottom, and lives upon the juices of other plants, about which it entwines itſelf, by means of ſmall threads of a red colour which it throws out. The flowers are ſmall, and come out in roundiſh heads, or bunches, many of them together, here and there, from the ſtem.

Small corn parſley, though it is very common among corn, does not ſeem to be much known. It is a low branching plant. The branches grow thick together, and are knotted and crooked. The flowers grow thick together after the manner of parſley, &c. and are of a white colour inclining to yellow. The ſeeds are large in proportion to the plant, and are ſet about with little crooked briſtles, which make them adhere to the ſtockings in great plenty when the ſeeds are ripe, which is about, or a little after harveſt.

The leſſer hemlock, called by Gerard, thin-leafed wild hemlock, is ſo well known under the name of fools parſley, as ſcarce to need a deſcription. However, as it is a matter of conſequence to diſtinguiſh poiſonous plants from thoſe which they reſemble, we may obſerve, that though the leaves reſemble parſley, yet they are much darker on their upper ſurface, but pale and ſhining underneath. The diviſions of the leaves are much ſharper, and they have no ſmell, nor ſcarcely any taſte. When the plant is in flower, it is eaſily known by the three long narrow green leaves, which hang down from the little ſtem that immediately ſupport the flowers,

Shepherd's needle or Venus's comb, has its names from the remarkable ſhape of the ſeeds with their appendage, reſembling in this reſpect the cranes bills: theſe would be alone ſufficient to diſtinguiſh the plant. They ſucceed ſmall white flowers: and come out in a bunch like needles, or the teeth of a comb ſet cloſe together. The leaves are very finely cut.

Knot-graſs is ſo called from its knots or joints, of which its ſlender creeping branches are full. After harveſt, the lands, in many places, ſeem all coloured with the little red flowers of this plant. It is called alſo, ſwine's-graſs; and, in the north, bird's tongue.

Black bindweed has a ſtem that lays hold on any neighbouring plants, and twines about them from right to left. Its leaves are ſmooth, and ſhaped pretty much like thoſe of the buck-wheat, which its ſeeds alſo reſemble, being triangular, but ſmaller. It frequently ramps up in hedges, and gardens, and is alſo very common among corn.

Corn-crowfoot has an upright ſtalk. The leaves are of a pale green, and cut into long, narrow, acute ſegments. The flowers are much ſmaller, and paler than in the crowfoots of the paſtures; but the ſeed veſſels are the moſt remarkable, for they are covered all over with prickles. This is extremely common among corn.

Charlock, called alſo chadlock, catlock, carlock, and wild rape, is, I ſuppoſe, too generally known to need a deſcription. The white and the yellow-flowered charlock, or wild radiſh, which are the only varieties of each other, and not ſo common as the former, may eaſily be diſtinguiſhed from it, by the paleneſs of their flowers, and the form of their ſeed-veſſel, which is round, ſmooth, and jointed. Almoſt the whole plant is covered with bent pellucid hairs.

Yellow vetching, or ſmall yellow fetch, has long ſlender divided ſtalks. The leaves are triangular, and grow by pairs cloſe to the ſtalk. Out of theſe leaves comes a tendril, by which the plant ſupports itſelf; and, on a long ſtalk, one ſmall pea flower, of a yellow colour, which is ſucceeded by a flat pod, about an inch in length, containing ſix or ſeven roundiſh ſeeds.

Corn-marigold, or golden-corn flower, is the buddle, or yellow buddle of Kent. Its leaves grow cloſe to the ſtem, in an alternate order. They are of a blue-green colour, and are cut about the edges. The flowers are like thoſe of the marigold, large, and a beautiful yellow.

Yellow rattle is known by its leaves being finly indented about the edges, its flowers being yellow; and its ſeed-veſſel ſwelling into a dry, large, compreſſed bladder, divided into two cells, and containing ſeveral compreſſed ſeeds, ſurrounded with a membrane.

Red eye-bright, or eye-bright cow-wheat, has a ſtem riſing not more than a foot high; long narrow leaves, indented about the edges, and purple flowers growing in ſpikes. It flowers in July and Auguſt.

Viper's bugloſs. The ſtalks are rough, round, ſolid, erect, undivided, and marked with black ſpots; the leaves are very rough, long, narrowing to a point, and placed without any certain order. The large ſpecious flowers, of a beautiful blue colour, grow in long bending ſpikes. They conſiſt of one petal, divided into five roundiſh ſegments, of different ſizes, and reſemble a horn in their figure, expanding by degrees, from a narrow beginning. The flower-cup conſiſts of five narrow ſegments, and contains four rough ſeeds.

Melilot is well known by its trefoil leaves, which are indented, and, as it were, eaten about the edges; and by its long, thin ſpikes of ſmall, yellow flowers, which are ſucceeded by ſhort rough pods, containing two ſeeds.

Wild carrot, bird's neſt, or bees-neſt, is very like the cultivated carrot, of which it is indeed ſuppoſed to be only a variety. The wild ſort, however, differs in its roots being ſmall and ſticky. In both ſorts, after they have done flowering, the umbels contract themſelves into the ſhape of a bird's neſt.

Cow parſnep, wild parſnep, meadow parſnep, or madnep. This grows three feet high. The ſtalk is round, furrowed, and hollow. The leaves proceed from a large membrane, or ſheath. They grow on long hairy ſtalks, and are divided and downy. The flowers grow in large umbels, are white, and conſiſt of five irregular petals.

Two oval, ſtreaked, compreſſed ſeeds, ſurrounded by a wing, ſucceed each flower.

Stinking hawkweed may be diſcovered by its very ſtrong ſmell like caſtor. As it is not a common weed, it is not neceſſary to be particular in the deſcription of it.

Muſk-thiſtle is known by its handſome purple nodding heads of flowers, which come out rather ſooner than moſt ſorts of thiſtle. The ſmell of them is agreeable.

Carline-thiſtle is very different from the other thiſtles. The hard, woody root, ſends up one round purpliſh ſtalk, beſet with prickly leaves in no order. This is terminated with ſeveral flowers, growing in a head. The ſmall ones, compoſing the whole, are of a duſky purple, and contained in a ſwelling ſcaly cup; the inner ſcales of which are very long, ſhining, coloured, ſpreading, and placed in a ring round the flowers. The ſtalks and heads remain all the year, with very little variation, upon the dry paſtures.

Perennial weeds in corn.

Field fox-tail, ſmall baſtard fox-tail, or mouſe tail-graſs, is known by its long, round, ſlender, ſmooth ſpike, of a duſky purple colour. The ſpikes are ſo very long and ſlender, that they uſually bend a little. This graſs is found in the moiſt furrows of arable land, and in any places where the water is ſuffered to ſtand.

Common wheat-graſs, or couch-graſs, is univerſally known, by its long white creeping roots. It grows very tall eſpecially in hedges. The ſpike reſembles that of wheat, in the manner in which the ſeeds are diſpoſed.

Common field ſcabious is all over rough and hairy. The ſtalk is upright; a foot, or a foot and a half in height, ſpotted, and branching. The lower leaves are oval, and indented about the edge. Thoſe which grow on the ſtalk are divided, and of that ſort which botaniſts call pinnatifid. The flowers are blue of the compound kind, conſiſting of a conſiderable number of ſmall flowers, each divided into four parts, and having one ſeed under them.

The taſte of the plant is a diſagreeable bitter.

Small bind-weed, called, alſo, with-wind, and hedge-bells, though theſe names ſhould ſeem rather to belong to the great bindweed, which ramps in the hedges; whereas this overſpreads the arable lands. The common people, in their wrath, have given this pernicious weed the ſame opprobrious names with the dodder, viz. hell weed, and devil's guts.

The ſtalks of this plant are weak, and twine about any thing. They come near, from left to right; and, when they find no ſupport, they trail along the ground. The leaves come out ſingle. They are three cornered, ſhaped ſomewhat like an arrow head, ſmooth, and placed on long foot-ſtalks. From the boſoms of the leaves comes out one flower on a very long foot-ſtalk. It is bell-ſhaped, of a beautiful colour, purple, red, white, or variegated; and is ſucceeded by a ſmall, roundiſh ſeed veſſel, containing four large, angular ſeeds. The whole plant is full of a milky juice.

Bladder-campion, white-corn campion, ſpattling poppy, white bottle, white ben, or frothy poppy. The ſtalks grow a foot and a half, or two feet high, round, ſmooth, jointed, branched towards the top; and at every joint is a pair of leaves, perfectly ſmooth. The flowers are white, and conſiſt of five bifid petals. The empalement, or outward covering, is puffed out into a roundiſh form; and is ſmooth, often varied with red, green, and white, and beautifully veined all over, like a fine net.

White campion, admitted into gardens, when it has a double flower, under the name of white batchelor's-buttons. It has a long and large root, of a ſharp bitteriſh taſte, ſending forth ſeveral ſtalks about two feet high; round, hairy, jointed, branching, of a red colour near the ground: a pair of leaves comes out at every joint, hairy, and ſharp-pointed. The flowers are like thoſe of the laſt: but the empalement, which is not puffed out like that, is oblong, with purpliſh ſtreaks down along it from top to bottom. The flowers of this are imperfect: the male or barren, and the female or fruitful, growing on diſtinct plants.

Small bramble, or dewberry-buſh, is diſtinguiſhed from the common bramble of the hedges, by the place of its growth, the trailing of its round branches, the ſmallneſs of its prickles, which are fewer in number, and chiefly on the ſtalks; the leaves growing only three together, being green underneath, and the ſide ones divided into two parts; and the blueneſs of its berries, which conſiſt of a very few large diviſions.

Corn-mint. We are told, on undoubted authority, that this herb will hinder milk from curdling; and that when hungry cows have been put after harveſt into a field where this plant abounded, it has been ſcarcely poſſible to turn their milk for cheeſe.

Corn reſt-harrow, reſt-plough, cammock, pretty whin, or ground furze. The hard, ſtubborn, creeping roots ſend forth many woody, round, ſlender, hairy branches, red towards the bottom. The leaves grow three together. The flowers of the pea kind, of a beautiful red colour, and are ſucceeded by a ſwelling, villous pod, containing a few roundiſh ſeeds.

Tree ſow-thiſtles. The root is very creeping, full of milk, and with difficulty eradicated. The ſtalk is about two feet high, ſmooth at the bottom, but hairy where it begins to branch out. The leaves are like thoſe of the dandelion, deeply cut, ending in ſharp points, and having the edges ſet round with tender prickles. The flowers grow ſeveral together; and reſemble thoſe of the ſow-thiſtle, but are much larger, of a deeper yellow, and ſurrounded by a very rough, hairy, dark-coloured empalement. They have the ſmell of bitter almonds, and are ſucceeded by downy ſeeds.

Great knapweed, matfellon, or bulweed. This plant is about two feet high. The ſtalks are round, ſtreaked, and hoary. The bottom leaves are oblong and undivided; but thoſe which grow on the ſtalk, are cut and divided. The flowers reſemble thoſe of the blue-bottle in ſhape, but are of a red colour. The ſeed is ſmall, oblong, reddiſh, and hairy in the upper part.

Corn horſe-tail grows in moiſt places. In April, naked ſtalks come up, which bear the flower and ſeed. Theſe are but of ſhort duration. In May, other ſtalks ariſe, hollow, jointed, about a foot high, and ſending forth all round, hollow jointed leaves, ſix or eight inches in length, ſubdividing into others at the joints.

Perennial weeds in paſtures.

Devil's bit is a kind of ſcabious. It differs from the common field ſcabious, in having undivided leaves, ſet thicker on the ſtalk; in the flowers not ſpreading out into a flat

a flat ſurface, but growing in a round form; and the ſmall flowers, which compoſe the whole, being all of a ſize and regular: and, laſtly, in the root looking, as if it were bit off at the end.

Great plantain, or way-bread, is eaſily known by its broad leaves, ſpreading on the ground, and marked on the under ſurface with ſeven ſtrong nerves. From the centre of theſe ariſe ſeveral naked, round, hairy ſtalks, ſuſtaining a long, cylindrical ſpike of ſmall flowers, ſet thick together.

Rib-wort plantain has much longer leaves, marked only with five nerves. The ſtalks are higher, and not round, but cornered, and the ſpikes of flowers are ſhorter.

Yellow ladies bedſtraw, cheeſe renning, maid's hair, petty mugwet. Its ſlender ſtalks riſe to about a foot. The leaves come out in whorls, eight or nine together. They are long and narrow, and of a deep green. Towards the top of the ſtalk, two little branches uſually come out, ſuſtaining a conſiderable number of ſmall yellow flowers, conſiſting of one petal, divided into four parts, and ſucceeded by two ſmooth roundiſh ſeeds.

Round-leaved bell-flower. The bottom leaves are roundiſh: thoſe upon the ſtalk long and narrow. The flowers are blue, bell-ſhaped, with the edge divided into five parts, and hang down.

Leſſer throatwort, or Canterbury bells. The ſtalk is cornered and undivided, about a foot high, and hairy. The flowers grow at the top of the ſtalk cloſe to it, ſeveral together. They are erect, of a beautiful purple colour, and divided to the middle into five acute ſegments.

Meadow ſaxifrage, Engliſh ſaxifrage, or ſtone-break. The root has a ſharpiſh, aromatic taſte. The ſtalks are round, ſtreaked, and reddiſh towards the bottom. The leaves are ſmooth, of a dark green, and divided twice into long narrow, ſharp ſegments. The foot-ſtalks membranaceous at the baſe. The flowers grow in looſe umbels, and are of a pale yellow. The ſeeds are oval, ſtreaked, and red at the top.

Burnet ſaxifrage is of two kinds. The large is found in woods, and the ſmaller in dry paſtures. Of this laſt there is a variety, differing only in the leaves, which are cut even to the root. The ſtalks are ſtreaked, and branched. The flowers grow in umbels cloſe together. They are ſmall, white, and conſiſt of five entire petals. Theſe are ſucceeded by two ſeeds of an oblong oval form. The root has a very hot taſte.

Crow garlick, or wild garlick. The leaves are round and ſmooth, reſembling much thoſe of ruſhes. From the midſt of theſe riſes a ſtalk, a foot or more in heighth, naked, ſlender, round, ſmooth, and hard; ſuſtaining many purple ſeeds, or little bulbs, about the ſize of grains of wheat collected into a round head.

White ſaxifrage, ſengreen, or ſtone-break, has kidney-ſhaped leaves ſpread upon the ground, and divided about the edges, not much unlike thoſe of ground-ivy, but ſofter and ſmaller, and of a faint yelloviſh green. Among theſe riſes a round, hairy, branching ſtalk, about ſix inches high, bearing ſpecious white flowers, conſiſting of five entire petals. This pretty little plant grows in dry paſtures, and may readily be known by its roots, which are made up of little knobs.

From a want of ſufficient diſtinction in names, a ſtrange confuſion has ariſen between the meadow ſaxifrage, burnet ſaxifrage, burnet, and white ſaxifrage. It is hoped theſe deſcriptions will contribute ſomething towards avoiding this confuſion for the future.

Agrimony has generally a ſingle, round, rough ſtalk, with leaves placed alternately upon it, which are winged with ſmall leaves, placed between the larger pairs. The yellow flowers grow alternately along the ſtalk, in a long row, after the manner of a ſpike, and are ſucceeded by rough ſeeds.

Dropwort is known by its winged leaves, the diviſions of which are all regular, and ſharply indented about the edges; by its white flowers, growing in a bunch like an umbel: but, principally, by its roots, which conſiſt of a bunch of knobs hanging upon threads, from whence it has the names of filipendula, and dropwort. The flowers ſmell agreeably.

Meadow-ſweet, or queen of the meadows. The ſtalk is angular, ſmooth, ſtrong, branching, and of a reddiſh colour. The leaves grow alternately, are winged, and conſiſt of three or four pair of lobes, and a very large one at the end, divided into three parts, like a raſberry-leaf. They are indented about the edges, white underneath, and wrinkled, like the leaf of the elm. The flowers are ſimilar to thoſe of the dropwort. The whole plant has an agreeable ſmell.

Tormentil, or ſeptfoil. The root is large, of a reddiſh colour, and an aſtringent taſte. The ſtalks are weak, and lie on the ground at firſt; but afterwards riſe up. The leaves are hairy, grow cloſe to the ſtalk, and are divided into ſeven parts. The flowers are yellow, and conſiſt of four petals. There is another ſpecies, not ſo common, differing from this only in having its ſtalks lying intirely on the ground, and the leaves growing on foot-ſtalks.

The crowfoots are too common every where to need a deſcription. They are known under the names of king-cob, king-cup, gold-cups, gold-knobs, butter-cups, and butter-flowers. The bulboſe crow-foot is diſtinguiſhed not only by its round root, but by the diviſions of the flower-cups being bent back, the ſtalk being erect, and that which ſuſtains the flowers being furrowed. The upright crowfoot has the diviſions of the empalement ſpreading out, as in the creeping ſort; but the flower-ſtalks are not furrowed, as in that and the bulboſe one. The leaves are divided, firſt, into three parts; and each of thoſe again into ſeveral. The upper leaves are long, narrow, and undivided. This plant grows much taller than the others. The flowers of all three are alike, and of a fine ſhining yellow.

Pilewort, figwort, or leſſer celandine. The root conſiſts of oblong knobs. The leaves are heart-ſhaped, cornered, and placed on foot ſtalks. The flowers reſemble in general thoſe of the crowfoots, but differ ſomewhat from them in having the cup divided only into three parts, the petals being about eight in number, and narrower. This low plant runs very much at the root, and choaks all plants which are near it.

Bugle, middle conſound, ſicklewort, or herb carpenter. It riſes about half a foot high, with a ſquare ſtalk. The leaves come out by pairs, of a purpliſh colour, and indented about the edges. The flowers grow in a ſpike, are blue, and have a very ſmall upper lip.

Self-heal, hooke-heal, ſicklewort, carpenter's herb, or prunell. This differs from bugle, in the leaves being longer and narrower: and in the flowers growing in a thicker ſpike; their upper lip being larger, and their filaments being forked.

Common

Common yellow toad-flax, or flax-weed. It creeps very much with its hard woody roots; which ſend up ſeveral ſmooth ſtalks, a foot, or a foot and a half high, covered with long, narrow leaves, placed without order. The flowers grow in cloſe ſpikes, on ſhort foot ſtalks, at the top of the ſtalks. They are of a light yellow, ſhaped like a calf's mouth, and end in the ſpur behind.

Ladies ſmock, cuckow-flower; in Norfolk, Canterbury bells. The ſtalk is upright, round, and ſmooth. The leaves are winged, with the lobes of the lower ones roundiſh; and of thoſe upon the ſtalk oblong. The flowers are large, handſome, and white, or purpliſh; conſiſting of four obtuſe veined petals. The ſeeds are contained in erect compreſſed pods, an inch, or an inch and a half long; divided into two cells: which, when ripe, burſt with a touch, and throw out their ſeeds to a conſiderable diſtance.

Crow foot crane's-bill, or blue crane's-bill. The leaves are divided, almoſt to the middle, uſually into ſeven parts. The ſtalk commonly divides into two branches, and each of theſe into two more. From the corner of each diviſion, comes a flower ſtalk, ſupporting two large blue flowers; conſiſting of five roundiſh, intire petals, ſucceeded by a long ſeed-veſſel, reſembling a crane's bill. This bill-like ſeed veſſel is thick and rough; but not ſo long as in ſome of the other ſorts.

Reſt harrow, or cammock, of the paſtures, differs very little from the corn reſt-harrow deſcribed before. The branches of this are armed with long ſtiff prickles. The flowers are of a higher purple, and come out ſingle: whereas, in the other, they come out together.

Dandelion, or piſs a-bed, is well known in all paſtures, by its milkineſs, and its naked hollow ſtalks, ſupporting one large, yellow, compound flower; which is ſucceeded by a round ball of downy ſeeds.

Rough dandelion, or dandelion hawkweed. The whole plant is rough, with forked hairs. The flower-cup does not bend back, as in the common dandelion: and this is a taller plant.

Yellow devil's-bit, ſo called, becauſe the end of the root ſeems as if it were bit off, is alſo known by the name of ſmall hare's hawkweed. The leaves are ſmooth, long, narrow, and cut into long, ſharp pointed ſegments. The ſtalks are a foot and a half, or two feet high, and branching. On the tops of theſe, grow many flowers, ſmaller and paler than in the dandelion; ſupported on ſcaly flower-ſtalks.

Long-rooted hawkweed. This has a very long tap-root. The ſtalks are a foot and a half high, or more; cornered, naked, and divided. The bottom leaves ſpread in a circle on the ground, and are jagged and rough. The flower-ſtalks are ſcaly. The flowers, and down of the ſeed, reſemble thoſe of the dandelion.

Dwarf, or ſmall purple carline thiſtle. This lowly plant ſpreads its prickly leaves a foot round, and ſuffers nothing to grow beneath them. Its purple flower comes out in the midſt of theſe, without any ſtalk, cloſe to the ground.

Colt's-foot, fole-foot, horſe-hoof, or bull-foot. In February, the ſcaly ſtalks ariſe, bearing one yellow compound flower; which is ſucceeded by a hairy white down. The leaves come out later. They are ſhaped ſomewhat like a horſe's hoof; and are downy underneath.

Butter-bur, or peliſtent-wart, reſembles colts-foot in many reſpects: but the flowers are purple, and grow in a thyrſe. The leaves come out after the flowers decay; and are like thoſe of the colt's foot in ſhape; but are three or four times as big.

Ragwort, ragweed, ſtagger-wort, ſtanerwort, St. James's wort, ſeggrum, or ſeagrim. The ſtalk is uſually ſingle, round, ſtreaked, ſolid, and of a purpliſh colour, in ſome parts. The leaves are very much jagged, ſmooth, and of a dark green. The flowers are yellow, radiated, and grow many together. When we affirmed that this plant comes up eaſily by hand, when young, or the ground is moiſt, we ſpoke from experience. The fact, in few words, was this. Some cloſes were notoriouſly over-run with this weed. The owner, juſt before the time of flowering, and after ſome rain, turned in a man and woman upon them; ordering the woman to pull up all ſhe could by hand, and the man to root out the reſt, with his docking-iron. The rag-wort was not, indeed, left in a lane, for the downy ſeeds to ripen; and to be carried on again to the cloſes, by the wind: but the plant was thrown in heaps, and burnt, and the aſhes were ſpread upon the graſs. It was not, indeed, all deſtroyed at this firſt attempt; but the few plants which came up the following year, were ſoon pulled up by the woman; and ſcarce a plant has now appeared in theſe cloſes, for ſeveral years paſt.

Fleabane, middle flea-bane, or fleawort. The ſtalk is round, bending, ſolid, and hoary. The leaves are oblong, ſharp-pointed, wrinkled, downy, and embrace the ſtalk, on which they grow very thick, without regularity. The flowers are yellow, radiated, and incloſed in a flower-cup, made up of narrow ſcales like briſtles. Mr. Ray tells us, that, if the leaves or tops of fleabane be ſqueezed, they ſmell like ſoap. Gerard ſays, the herb-women call it herb Chriſtopher.

Greater daiſie, ox-eye, or maudlin-wort. The ſtalk is five cornered, ſolid, and branching. The leaves are jagged, and embrace the ſtalk. The flowers are large, and radiated. The ray is white; and the diſk yellow: the ſeeds have no down.

Common yarrow, milfoil, or noſebleed. The ſtalks are ſlender, round, ſtreaked, ſtiff, and hairy. They are divided towards the top into ſeveral branches; and theſe again into flower-ſtalks, ſupporting ſmall white or purpliſh flowers, growing thick together in a kind of umbel. The leaves are cut very fine, and divided twice.

Common, or black knapweed, matfellon, black matfellon, or bullweed. The root is hard, thick and woody, and has a diſagreeable aſtringency. The ſtalks are round, rough, ſtreaked, ſtrong, and very tough. The leaves are irregularly placed, oblong, and of a dark green. From the wings of the leaves ariſe ſtalks, ſupporting one, two, or three heads of flowers, which are purple, and incloſed in a ſcaly cup: the ſcales are black, and ſurrounded with fine hairs, like the eye-laſhes.

The orchiſes may be known by their roots; which are either a double bulb, reſembling a pair of teſticles; or a bunch of long fleſhy roots, like the fingers of the hand. The flowers, by growing in a ſpike, make a handſome appearance. The colour is red in moſt ſorts.

Adder's tongue is hid among the graſs in low meadows. From a very low ſtalk, ariſes a ſingle, thick, ſmooth, oblong leaf; from the boſom of which, iſſues a kind of tongue, ending in a point, and indented on each ſide like a file.

WEEVIL, an inſect of the beetle kind, reſembling a ſmall May bug, with a long ſharp pointed head, to the hinder part of which are fixed two antennæ. It is black, and

and therefore eaſily diſtinguiſhed in any corn: but its principal and favourite food is wheat, of which, either old or new, and devours great quantities; without however communicating any bad ſmell to it, as the moth does. Some call it the corn-louſe, becauſe it bites animals more ſtrongly than fleas do. This has made it to be looked upon as a carnivorous inſect; and many have pretended that it devours both the worm and the chryſalis of the falſe moth: an opinion which M. Duhamel does not think improbable, becauſe, in effect, very few of thoſe moths are ever found in corn where there are many weevils.

Upon thruſting one's hand into a heap of corn, one may eaſily perceive by its heat, whether it contains many of theſe inſects, which generally lie pretty much collected; and the particular places where they are moſt numerous, feel much warmer than the reſt. This obſervation ſoon led M. Duhamel to think, that a conſiderable heat is probably neceſſary for the hatching of their eggs; and that in this caſe, even if they ſhould live, they will not be able to breed, in his ventilating granaries.

To aſcertain this fact, he put ſome weevils into wheat (not ſtove-dried) in one of thoſe granaries, in May 1751. It was well ventilated from time to time, and opened in Auguſt 1752, when none of them were found. He did the ſame with wheat which had been ſtove dried; and when the granary was emptied, a year and half or two years after, not a weevil could be ſeen.

He again put ſome weevils into a ventilating granary in which wheat of the year 1754 was laid up, without having been ſtove-dried. This corn was taken out in May 1756, and ſifted over a fine ſcreen; which gave him an opportunity to obſerve whether the weevils had increaſed. The number ſeemed to him nearly the ſame as that he had put in: and a farther reaſon which induced him to think they had not multiplied, was, that this grain, inſtead of being heated, as corn is well known to be whenever weevils breed in it, was ſo cool, that a country fellow employed for this work could hardly remain bare-footed among it.

In 1755, Dom Edward Provenchere, procurator of the Carthuſians of Liget, near Loches, in the Province of Touraine, intending to make ſome experiments on the preſervation of corn, choſe for that purpoſe a large caſk, at one end of which a little above the common bottom, he put a floor of lattice work, and over that a canvas. This caſk was filled with wheat of the harveſt of 1754, of which it contained 1080 pounds. He then fixed to it a pair of middle ſized bellows, ſo ſituated that they might eaſily be worked; and nearly in the centre of this corn, he put as many weevils as weighed ſix drachms; which is pretty conſiderable for that quantity of grain.

The bellows were blown an hour every week. In the beginning of September 1756, when that operation had been neglected for ſome time, the corn began to heat: but it was ſoon cooled again by uſing the bellows. The 15th of October, on taking the corn out of this caſk, in which it had kept perfectly well, not above twenty weevils were found in it. Dom Edward ſays he ſaw that inſect come out of the vent-holes every time the bellows were blown. He perceived in many places ſeveral grains of corn linked together by threads, certainly formed by moths that were in his wheat (which had not been ſtove-dried), and, not dying immediately, had had time to ſpin their web.

Dom Edward filled another caſk with nine hundred pounds of barley, not ſtove-dried, and put into it ſix drachms of weevils. Though care was taken to ventilate this caſk as much as the former which was filled with wheat, that is to ſay, during an hour every week, yet this corn heated prodigiouſly: the bellows could not cool it, and the weevils multiplied in it exceedingly.

"This, ſays M. Duhamel, is the very thing that happened to me in my larger experiment on the ſame kind of grain. Barley probably contains a great deal of moiſture; and the queſtion is whether ſtove-drying can be able to preſerve it. The increaſe of the weevils here ſeems to prove that this inſect cannot multiply in corn which retains a proper degree of coolneſs."

Though the above experiments ſeem to prove pretty clearly, at leaſt that the weevil cannot breed in corn which is kept properly cool, and that if any ſure way to deſtroy this inſect be ever diſcovered, it will be moſt likely to ſucceed by means of the ventilating granary; yet M. Duhamel, with his conſtant candour and unvaried zeal for the welfare of mankind, exhorts the naturaliſt, the philoſopher, the lover of the public good, not to rely too much on any thing that he has ſaid in this reſpect; to look upon the trials which he has related, as ſteps only which may help to lead to that deſired end; and to continue their endeavours to render to the world the important ſervice of ſhewing how this creature may be effectually exterminated, by any ſafe and practicable method.

"I have tried, continues he, in his lateſt writings upon agriculture, many of the receipts moſt vaunted in books of huſbandry, as remedies againſt the weevil, and have not found the leaſt benefit from any one of them. All that they have taught me, is that this animal will endure a great deal before it can be killed. It will live a long time without eating: cold will benumb it ſo as to make it appear to be dead; but I have put ſome of them, in that ſtate, into a warm place, and after keeping them there for ſome time, have found that they were perfectly alive: the great coolneſs of my granaries has ſeemed to prevent their increaſe: but it has not killed them. They bear eaſily a heat of from forty-five to fifty degrees of Réaumur's thermometer (from one hundred and fifteen to one hundred and twenty-four of Farenheit's). I kept corn in which there were many weevils, during half an hour, in a place heated to upwards of eighty degrees of Réaumur's thermometer (two hundred and ten of Farenheit's): ſome of them periſhed; but others remained alive. They, therefore, who would deſtroy them by ſuch a degree of heat, muſt let their corn be expoſed to it during ſeven or eight hours at leaſt.

"I grant that the ſmoke of ſulphur will kill any inſect; but that method is not practicable in granaries: for this vapour, which is very light, aſcends to the top of the granary, and ſcarcely acts at all upon the corn on the floor. It is true, that the corn may be ſo diſpoſed as to let this ſmoke paſs through it, and all the inſects in it will then be deſtroyed. But, at the ſame time, this ſmoke will give the corn a very diſagreeable and laſting ſmell, which depreciates it entirely. Conſequently this method will not do.

"It is confidently ſaid, that the weevils may be driven away by turning the corn with ſhovels rubbed with eſſence of turpentine. To try whether this eſſence really diſpleaſes them, I ordered two large caſes to be made: the inſide of one of them was rubbed with eſſence of turpen-

tine; both of them were filled with corn in which there were many weevils; and the inſects remained as quiet in the one as in the other. It is true, that when corn infeſted with weevils is turned with a ſhovel, ſeveral of thoſe inſects quit the heap, and haſten towards the walls of the granary. This may have been imputed to the rubbing of the ſhovel with oil of ſpikenard or eſſence of turpentine: but the ſame thing happens when the ſhovel has not been rubbed with any drug whatever; and the fugitive weevils ſoon return to the heap of corn.

"When corn is ſifted in a ſieve (and the ſame is applicable to a ſcreen) fine enough to retain the grain, the weevils then agitated, ſhrink up their legs, and are, in that poſture, generally ſo much ſmaller than the good corn, that very many of them drop through the ſieve. The greateſt part of them may therefore be deſtroyed by this method, which is a very good one: but unfortunately, there will ſtill remain enough of them among the corn, to do conſiderable damage. This ſieve or ſcreen ſhould be of wire; and under it ſhould be placed an earthen or copper veſſel, pretty deep, to receive the inſects, and ſmooth on its inſide, to prevent their getting out eaſily.

"Of all the methods I have tried, that which has ſeemed to me to be the beſt, is to dry the corn in a ſtove, or oven, heated to eighty or ninety degrees of M. de Réaumur's thermometer (*from two hundred and ten to two hundred and thirty of Farenheit's*) and to let it remain there twelve hours. I exhort all thoſe who wiſh the welfare of the public, to ſtudy the means of deſtroying the weevil, and, in conſequence thereof, to make particular experiments: but I beſeech them not to publiſh their diſcoveries till they have made repeated trials of them, and that in different granaries: for I have ſometimes ſeen theſe inſects forſake a granary, when no cauſe could poſſibly be aſſigned for ſo doing."

WELD, *or* DYER'S WEED, the name of a plant much uſed by the dyers to give a yellow colour to woollens, ſilks, cotton, and thread.

Its root, which is compoſed of a few ligneous fibres, does not pierce deep; from this root it puts forth leaves about four inches long and half an inch broad, of a lively green, ſoft to the touch, and ſpread circularly near the ground, with ſome gentle wavings at their edges, but obtuſe at their points. Its ſtem, which riſes from amidſt theſe leaves to the height of three feet, or even more if the ſoil and culture be very good, often branches out, and is garniſhed with leaves like thoſe below, though ſmaller in proportion as they approach the flowers, which grow in long looſe ſpikes at the end of the branches or ſtem. Theſe flowers, which appear at the latter end of June, are each of them compoſed of three ſmall irregular petals of a greeniſh yellow, to which ſucceeds a globular berry of the ſame colour, terminated by three points, and in which are incloſed ſmall brown ſpherical ſeeds. Theſe ſeeds ripen in September, the plant becomes entirely yellow when it is dry, and the whole of it, but eſpecially the berry, is uſed in dying. The ſlendereſt weld, and particularly if it inclines to a ruſſet colour, is accounted the beſt: that which is larger, and of a dull green, is much leſs eſteemed.

This plant grows naturally along the ſides of high-ways, upon dry banks, and on old walls, in many parts of England, France, Spain, and other countries where the winters are not very ſevere: but the cultivated ſort is far preferable to the wild, both for the quantity and the goodneſs of the colour which it yields. It will thrive tolerably on almoſt any ſoil, provided it be dry and warm: but the richer the land is upon which it is ſown, the greater will be the produce; and in proportion to the care with which it is cultivated, the more vigorous and fit for dying will it be.

The ground for this, as for every other plant, ſhould be in fine tilth at the time of ſowing it; though here, unleſs it be very poor indeed, it will not require dung. The ſeed ſhould be that of the preceding year; for if it be older, great part of it will not grow. Both Mr. Worlidge and M. Du Hamel are of opinion that weld ſeed ſhould, on account of its ſmallneſs, for it is but little bigger than that of purſlane, be mixed with aſhes, buckwheat, oats, or ſome other ſimilar ingredient, in order the better to avoid ſowing it too thick; for the plants of weld thrive beſt when they are about ſix inches aſunder. For this reaſon, as was before obſerved in regard to all plants which require being hoed, it is beſt to ſow weld in rows. Some ſow it on barley, or oats after they have been ſown and harrowed, this requiring only a buſh to be drawn over it; for it ſhould not be covered deep. A gallon of weld-ſeed thus uſed in the broad-caſt way will be ſufficient to ſow an acre of land. It will not grow much during the firſt ſummer, when it is thus ſown; but it will thrive a pace after the corn is taken off.

The beginning or middle of Auguſt is a proper ſeaſon for ſowing weld in this country. The only care that it requires whilſt growing, is to keep it clear of weeds which might choak it, or at leaſt weaken its growth.

The French, in general, ſow their weld in March, and pull it up in July or Auguſt of the enſuing year, when part of its ſeeds are ripe, and the plant is ſtill of a greeniſh yellow: they then dry it and threſh it upon cloths, to get the ripeſt of the ſeed, and after this they tie the ſtalks up in bundles, and ſell them to the dyers. But Mr. Miller rightly judges, that the beſt time to pull the weld for uſe is when it begins to flower, that is to ſay, about the latter end of June, becauſe, like all other vegetables, it is then in its greateſt vigour, and conſequently beſt fitted to yield the greateſt quantity of dye. For a produce of new ſeeds, it is much better to ſow a ſmall piece of land on purpoſe, or to ſet apart for this end a ſuitable portion of the field of which the plants are intended for uſe, rather than let the whole ſtand too long, that is to ſay, till part of the ſeeds are ripe; becauſe, by letting the plants ſtand till then, their quality is injured far beyond the value of the ſeeds that are got from them (the berries being, as was obſerved before, the part which yields the fineſt dye); and beſides, the ſeeds thus obtained will of courſe be a mixture of ripe and half-ripe ones, on the growing of which there cannot be a due reliance. The common way of drying theſe plants is to ſet them upright in ſmall handfuls in the field, and when they are dry, to tie them up in bundles. They muſt alſo be houſed dry; and care muſt be taken to ſtack them ſo looſely that there may be room for the air to paſs between them, to prevent their fermenting.

The plants which are intended for ſeed ſhould be pulled as ſoon as their ſeeds are ripe, and then be dried and beaten out for uſe: for if this is deferred, or if they are let ſtand too long, the ſeeds will ſcatter.

The method of cultivating this plant at Oiſſel, in Normandy, where great quantities of it are raiſed for exportation

tation to Holland, independent of the conſumption in France, is thus related by M. Dambourney, in the Memoirs of the Royal Society of Agriculture at Rouen.

"In the month of July juſt after the kidney beans then in bloom have been hoed for the ſecond time, and earthed up, eſpecially if there be an appearance of approaching rain, weld ſeed is ſown among them, very thin, as equally as poſſible. Careful huſbandmen bury this ſeed by dragging over it a ſmall buſh of thorns. Whilſt the weld riſes, the beans ripen and are gathered; after which the ground remains, of courſe, planted with weld only. This is hoed about Michaelmas, then left in that condition during the winter, and in the enſuing month of March, when the danger of froſts is judged to be over, it is hoed again, to extirpate ſuch weeds as may have come up in the mean time. Towards the end of June in this ſecond year, when the weld has done bloſſoming, when its berries form, and when the plant begins to turn yellow, advantage is taken of the firſt fair day after a rainy one, to pull it up. Two men will then pull up as much of it in one day, as four men can when the ground is dry and hard. It is carried off in large bundels: but theſe are untied before the weld is laid up for keeping, and the plants are ſpread out and ſet upright againſt walls or hedges well expoſed to the ſun, the heat of which completes their drying in two days. They are then laid upon a cloth, to prevent the loſs of the ſeed, which drops very eaſily out of the now open capſules; and finally, after being tied up again in bundles weighing about thirty pounds apiece, they are piled up looſely in a barn or other well covered place, where they complete their ripening, and generally ſhrink to leſs than half of their former weight.

"Weld raiſed on rich ground is apt to be greaſy and too full of ſtalks: that which grows in ſandy places is of a better quality, and has only one main ſtem: but, in return, the produce here is much leſs than in the former caſe.

"As ſoon as the weld has been pulled, ſheep are turned in upon the land, to eat up the graſs it may have produced: it is then ploughed once; and after another ploughing at the end of October, it is ſowed with wheat, or great rye, without uſing any other compoſt or dung. If the land is light and deſtined for ſpring-corn, turnips may be ſown upon the firſt ploughing after the weld; for they will have time to grow big enough to be pulled before the ploughing for oats or ſmall rye, which laſt crops it will be proper to help with a little ſhavings or raſpings of horn.

"If it be intended to raiſe weld after peas, the ground ſhould be ploughed, and the ſeed ſown very thin: to do which the more effectually, this ſeed, like that of turnips, ſhould be taken up only in pinches between the middle finger and the thumb, and the fore-finger ſhould remain extended, the better to help its ſpreading when it is dropped. This ſeed ſhould be ſown in rows ſufficiently diſtant for the plants to have full room to grow; and the beſt way is to leave an alley after every third row. When ſown, it is harrowed in, and the only farther care that the weld requires is to keep the plants free from weeds, by hoeing the ground at Michaelmas and in March, as before directed.

"The weld which is ſown after peas does not injure the land it grows on; and therefore in this caſe as after the kidney-beans before ſpoken of, wheat may be ſown in October without any previous manure.

WHEAT, the name of a well known plant, greatly cultivated in many parts of the world, eſpecially in England.

As a crop of wheat, is, in general, the principal riches of farmers whoſe farms conſiſt of arable land, we ſhall be very full in deſcribing every method yet practiſed with ſucceſs for cultivating this uſeful ſpecies of grain; and in order to this, ſhall begin with the method of preparing the ſoil by ploughing, harrowing and rolling.

Ploughing increaſes the food of plants, by opening the ſoil to receive the vegetable food from the air; and by enlarging the ſurface, and thereby expoſing a greater quantity of the ſoil to its influence.

Ploughing enlarges the paſture of plants, by opening the ſoil if too ſolid, and making it firm, if too light.

Ploughing prepares the vegetable food for entering the roots of plants, by reducing vegetables to a ſtate of corruption, and diſſolving oils.

Ploughing deſtroys weeds, by making their ſeed vegetate, and then tearing up the young plants; and by expoſing their roots to the drought.

Ploughing removes wetneſs, by laying up land in proper ridges.

It may be ſaid, therefore, that ploughing is one of the moſt important operations in agriculture; and that the greateſt care is to be taken in the performance of it.

Though ploughing in general ſerves all the purpoſes mentioned, yet commonly one of them only is chiefly in view; and according to the deſign in view the work is to be performed.

When the deſign of ploughing is to increaſe the food of plants, the ſurface cannot be made too uneven; for the more uneven that the ſurface is made, the greater quantity of the ſoil is expoſed to the influence of the air, and the greater quantity of food procured.

When the deſign of ploughing is to enlarge the paſture of plants, that kind is beſt that goes deepeſt, (provided the ſoil allows,) and moſt effectually breaks the mould; for the deeper that the plough goes, the greater quantity of ſoil is employed in vegetation; and the more effectually that the mould is broken, the larger is the paſture in the ſame quantity.

When the deſign of ploughing is to deſtroy root-weeds, the ſurface cannot be left too rough, nor the earth of the furrow raiſed in too large pieces; for the rougher that the ſurface is, and the larger that the pieces of earth raiſed, the drought has the eaſier acceſs, and more effectually operates in the deſtruction of the roots.

When the deſign of ploughing is to deſtroy ſeed-weeds, the ſurface cannot be made too ſmooth, nor the mould too much broken: for the ſmoother that the ſurface is made, and more effectually that the mould is broken, the ſeeds are the more expoſed to the influence of the air, the ſap better preſerved, and their vegetation the more encouraged.

When the deſign of ploughing is to remove wetneſs, the land muſt be laid up in high and narrow ridges; for the greater number that there are of furrows, there are the greater number of drains; and the higher that the ridges are, the more eaſily the water finds its way to the furrows.

Thus we ſee how this operation of ploughing is to be performed, according to the chief deſign in view. It often happens, however, that land is in ſuch a condition as to require more than one of theſe advantages which ploughing is intended to promote. Theſe are ſometimes

conſiſtent with each other, and the land may be ploughed in ſuch a manner as beſt to promote all of them. Thus land is ſometimes, at the ſame time, poor, and wet, and full of root-weeds: now, it may be ploughed in ſuch a manner as is moſt proper for encreaſing its food, removing its wetneſs, and deſtroying its weeds: for, by one ploughing, its ſurface may be made uneven, which fits it for receiving an increaſe of food; it may be formed into narrow and ſteep ridges, which beſt remove its wetneſs; and the earth may be raiſed in large pieces, which beſt expoſes the roots of the weeds to be deſtroyed by the drought.

At other times the land is in ſuch a ſituation, that the advantage which it requires from ploughing are inconſiſtent with each other, and it cannot be ploughed in ſuch a manner as is moſt proper for promoting all of them. Thus land at the ſame time, may be full both of ſeed-weeds and of root-weeds: now, it cannot be ploughed in ſuch a manner as is moſt proper to deſtroy both; for by one ploughing it cannot be raiſed in pieces and left rough, which is neceſſary to deſtroy root-weeds, and have the mould broke and be made ſmooth, which is neceſſary to deſtroy ſeed-weeds. This makes it neceſſary to have one of theſe things chiefly in view at firſt, and to conſider which of the two it is proper to begin with, and how the work may be performed in ſuch a manner, as the other may moſt eaſily ſucceed. Thus, in the preſent caſe, the land ſhould be ploughed, ſo as to be raiſed in pieces, and to be left rough; and in that condition it ſhould be allowed to lie, till the drought may be ſuppoſed to have deſtroyed the roots; and then it may be reduced, the pieces broke, and the ſurface made ſmooth, in order to deſtroy the ſeeds.

In ploughing there are ſome general rules to be obſerved, whatever is the deſign of it. Thus land is never to be ploughed when it is wet. When land is ploughed wet, the deſign of ploughing, whatever it may be, is fruſtrated; and this holds true in every kind of ſoil.

When ſtiff ſoil is ploughed wet, by drying too ſuddenly it becomes ſo hard, that it can receive no benefit from the air, and the paſture in it is entirely ſhut up: root-weeds ſtrike root again before the drought reaches them; and if there are any ſeed-weeds, the ſurface cruſts ſo ſoon, that they are prevented from vegetating.

When light ſoil is ploughed wet, though it may receive ſome benefit by expoſing a larger ſurface to the influence of the air, yet its pores, being full of water, will prevent its paſture from being enlarged; and the root-weeds that are in it, will not be deſtroyed; they will rather flouriſh by being tranſplanted into a new paſture. In both kinds of ſoil the labour is very ſevere upon the cattle, and the land is greatly damaged by their going upon it, and treading it down with their feet.

Thus it is alſo to be obſerved, that whatever is the deſign of ploughing, the quantity of firm land taken off from the ſurface of the plough in going, ought not to exceed the wideneſs of the furrow which the plough makes below. If it does, the land is not clean ploughed; it is only ſcratched, and a quantity of the ſoil is left below untouched betwixt every furrow that the plough makes.

The quantity of firm land to be taken off by the plough, depends upon the deſign of ploughing, and the nature of the ſoil.

When the deſign of ploughing is to encreaſe the food of plants, and deſtroy root-weeds, whether the ſoil is ſtiff or light, as great a quantity may be taken off as the plough can take conveniently; becauſe the greater that the quantity is which the plough takes off, the rougher and more uneven the ſurface is made, the more food is procured, and the root-weeds more effectually deſtroyed.

When the deſign of ploughing is to enlarge the paſture of plants, and deſtroy ſeed-weeds, though a large quantity may be taken off in a light ſoil, that naturally falls in pieces when turned over, yet a ſmall quantity ought to be taken off in ſtiff land that is not ſo eaſily reduced; becauſe the ſmaller that the quantity is which the plough takes off, the ſoil is the more effectually broken, and the ſurface made the ſmoother; and the more effectually that the mould is broken, and the ſmoother that the ſurface is made, the paſture is the more enlarged, and the weeds more effectually deſtroyed. This is agreeable to the ordinary practice, introduced no doubt from experience; for we find that a much leſs quantity is taken off when land gets the ſeed-furrow, the chief deſign of which is to enlarge the paſture, than at any other ploughing.

In the directions which we have given about ploughing, we have had chiefly in our view land employed in tillage; it is neceſſary to add ſomething with reſpect to the ploughing lea, or opening up graſs ground.

The Engliſh writers on agriculture, when giving directions about the opening of graſs ground, always ſuppoſe that the land is to be ſummer fallowed; and they recommend to plough as deep at firſt as the nature of the ſoil will allow. They aſſign this reaſon, That it is not poſſible to plough deeper afterwards. They likewiſe direct to turn the earth upſide down, or on its back, as we have called it. The reaſon they aſſign for this is, that the ſward or turf may be the ſooner rotten.

Some perſons tried this method of breaking up graſs-ground in Scotland, but they found great difficulty in reducing it; and we have reaſon to believe that many find it ſo likewiſe in England; for Mr. Tull, in his chapter upon ploughs, tells us, that if the turf lie long without being turned, the graſs from the edges will ſpread and form a new turf, and that the roots often ſet up new heads, and the former heads are converted to roots. As Mr. Tull's deſign is to ſhew the neceſſity of the four-coultered plough, we need not doubt but he has a little exaggerated the matter; for, upon a narrow inſpection, it will be found, that if turf is turned upon its back, the graſs will grow only from the ſides. However, we may conclude, from what he ſays, that the land in England is not ſo eaſily reduced in this manner, as ſome pretend.

On the rich lands in Scotland, they follow a method the very reverſe of this which has been mentioned. They commonly ſow after one ploughing of graſs-ground, and plough as ſhallow and narrow as poſſible; and alſo ſet the turf as exactly as poſſible upon its edge. It is not our buſineſs in this place to conſider the propriety of ſowing after one furrow. We may only obſerve, that if the land is good, a good crop may be expected; and if there is a good crop, the turf will be completely rotten before next ſeaſon. What we have to conſider, is, which is the moſt proper method to break and reduce the turf. It is certain that the thinner and narrower the turf is taken off, the more eaſily it is torn aſunder, and the more that it ſtands on its edge, the harrows in going acroſs take the firmer hold, and make the greater impreſſion.

If this kind of graſs-ground is ploughed before winter in the manner mentioned, ſhallow and narrow, and the turf ſet upon its edge, it may be expected, if we are favoured with

with a little froſt, that in the ſpring the turf will be in ſuch condition, as to be eaſily torn aſunder by the harrows, and the land itſelf in a proper condition to be ſown with oats, or to be ſummer-fallowed, and ſown with wheat.

Their barren lands they break up in the ſame manner as in England. They plough deep, and turn the turf over on its back. It ſeems, that the plants which grow on theſe lands have tougher and ſtronger roots than thoſe that grow on rich lands. This makes it more difficult to break the turf. If the earths of the furrows are ſet on their edge, the harrows turn them back, inſtead of tearing them aſunder. This happens whether the land is ploughed deep or ſhallow. But when the earths are turned on their back, and the land ploughed deep, the harrows raiſe a kind of mould upon the back of the turf, by which the hollows betwixt the earths are filled up, and nouriſhment afforded for the ſeed, the greateſt part of which falls into theſe hollows.

There is another method propoſed for opening up graſs-ground, and that is by trench-ploughing. This manner of ploughing is performed by one plough following another in the ſame track. The plough that goes firſt, turns over the ſward or turf; and the one that follows, turns up ſome inches of ſoil upon it. By this method there is ſufficient nouriſhment provided for the crop, and the ſward is rotten before next ſeaſon.

This kind of ploughing needs not be confined to the opening up of graſs-ground; it may be uſed in any ſoil that is deep; for by it ſome new ſoil is turned up, and a greater quantity employed in vegetation.

It has already been obſerved, that ploughing in ridges is proper for removing wetneſs. Every furrow becomes a kind of drain: the rain that falls upon the ridge, makes its way to the furrows, and by means of them is conveyed away from the field.

Ploughing in ridges is alſo proper for enlarging the ſurface. It is certainly an advantage to have the ſurface enlarged. Thereby not only a greater quantity of ſoil is expoſed to the influence of the air, but alſo a great quantity of it actually employed in vegetation. There is no more ſoil added to the field by enlarging the ſurface; but ſome of the ſoil that lies buried, while a field is in its natural ſtate, is expoſed to the air, and brought within reach of the roots of plants, when it is laid up in ridges. Some of the plants which we cultivate in our fields, have what are called horizontal roots, that is, roots that creep along the ſurface, and go down but a ſhort way. Now, it is obviouſly an advantage to theſe plants, to have a quantity of the ſoil below, to which their roots cannot extend, brought within their reach, which is done by enlarging the ſurface.

The tap-rooted plants, that is, ſuch as puſh one principal root perpendicularly downwards, have alſo horizontal roots, by which they are nouriſhed; and therefore it muſt likewiſe be an advantage to them, to have the ſurface enlarged.

To illuſtrate this further, let us ſuppoſe, that the roots of plants upon a field extend themſelves through the whole ſoil within four inches of the ſurface. Now, it is obvious, that there is more ſoil within four inches of the ſurface, when the ſurface is enlarged by ridges, than when the land is lying quite flat.

From theſe things then it appears, that a field contains more food, and has a larger paſture when in ridges, than when laid down level.

It muſt be acknowledged, that ſome conſiderable perſons are of a different opinion; and as this is the caſe, it will not be improper to conſider what is advanced by them.

There are ſome who mention the perpendicular growth of plants, as an evidence, that a ſurface, however much extended, can ſupport no more plants than the horizontal baſe. Though the fact is allowed, that plants grow perpendicularly, and that it is impoſſible to place more of them upon the ſurface than when the baſe; yet it does not follow, that a field, when its ſurface is enlarged, can nouriſh no more of them; and it is to be remembered it is not more room which we contend for, but more nouriſhment. We may further obſerve, with reſpect to the growing of vegetables, that the enlarging the ſurface has this other advantage; it gives the plants more air, and thereby prevents them from falling down and lodging.

Mr. Du Hamel, to ſhow that the enlarging the ſurface by ridges is a real diſadvantage, obſerves, that ſuppoſing the ſlope in ridges is one foot in ſix, yet the ſurface will be to the horizontal baſe only as ſeventy-ſix to ſeventy-five, which he ſays, is but a ſmall advantage, when compared to the loſs by the furrows.

In anſwer to this, it needs only be ſaid that there is no loſs by the furrows, unleſs when they are a real advantage to the reſt of the field. When land is dry, the corn is as good in the furrows as in any part of the ridge; and when the land is wet, the furrows ſerve for drains, and the loſs by them is more than made up by the advantage which the reſt of the field receives by being drained.

We may therefore conclude in the general, that the way of ploughing in ridges is preferable to the way of ploughing without ridges.

Having ſhown, that ridges are advantageous, as they remove wetneſs, and enlarge the ſurface, it is neceſſary now to conſider what kind of ridges are moſt proper for anſwering the ends propoſed.

As ridges remove wetneſs, when the ſoil is wet, the ridges ought to be narrow; for the greater number there are of ridges, there are the greater number of drains. When the ſoil is wet, the ridges ought alſo to be ſteep. For the ſteeper that the ridges are, the water more eaſily finds its way to the furrows.

When the ſoil is very dry, it is ſubmitted, if narrow ridges are not proper likewiſe. For by altering the ridges, and turning the furrows into the crowns, and the crowns into the furrows, a quantity of freſh ſoil is always employed in vegetation. When the crown of a ridge is turned into a furrow, it is obvious that ſome freſh ſoil is turned up, which was not employed in vegetation in its former ſituation; and the greater number there are of ridges, there is the greater quantity of freſh ſoil employed.

When the ſoil is juſt ſo wet as to occaſion loſs in the furrows, then the ridges ſhould be ſomewhat broader. For, in this caſe, the fewer there are of furrows, there is the leſs loſs.

It is proper to obſerve here, that a difference ſhould be made betwixt the ſituation of land in the winter, and its ſituation in the ſummer. It may be convenient ſometimes, when winter-grain is to be ſown, or when the land is to get winter-fallowing, to make the ridges very narrow; and, when ſummer-grain is to be ſown, to make them broader.

As it is an advantage to have the ſurface enlarged, the ridges ought to be made high in the middle, or crown.

For

For the higher that the ridge is made, the more is the ſurface enlarged.

When the ſoil is ſhallow, the ridges, if broad, cannot be raiſed, without depriving the furrows of ſoil: and therefore, to enlarge the ſurface on ſuch land, the ridges muſt be made narrow. For this both enlarges the ſurface, and prevents the furrows from going below the ſoil.

When the ſoil is deep, the ridges may be made broader: for though the ridges are raiſed in the crown, yet ſtill there is ſoil left in the furrows. But then the ridges muſt not be made too broad: for it is evident that narrow ridges give more ſurface than broad ridges, of the ſame degree of ſteepneſs, and do not cover the lower parts of the ridges ſo much from the influence of the ſun and winds.

It is neceſſary to obſerve, that though, in the general, it is recommended to raiſe the ridges in the crown, to enlarge the ſurface, and to allow the water more eaſily to find its way to the furrows; yet, in ſome low flat-lying land, it is proper to make the ridges as flat as poſſible, in order to raiſe the furrows. For the higher that the furrows are raiſed, there is, in ſome caſes, the greater command of the water, and it is the more eaſy to find a fall for conveying it away.

It is neceſſary to obſerve likewiſe, that flat ridges have this advantage over ſteep ridges; they can be ſown with greater exactneſs. It is obvious from the method of ſowing, that, in ſowing ſteep ridges, it is not poſſible to prevent a great proportion of the ſeed from falling into the furrows. It is obvious likewiſe, that this proportion is increaſed by harrowing. Whereas, in ſowing flat ridges, the ſeed is equally ſcattered, and the harrows do not remove it from its place.

From theſe obſervations, it is obvious, that ſoils in different ſituations require to be laid out in different kinds of ridges. It is abſurd, therefore, to aſſert, that, in every caſe, one kind of ridges is preferable to another; that narrow ridges are better than broad ridges, and flat ridges better than ſteep ridges. In ſome ſituations, one kind of ridges is moſt proper; and, in other ſituations, another kind is moſt proper. Every perſon ought, therefore, to conſider the nature of the ſoil he has to deal with, conſider the advantages and diſadvantages of each kind of ridges, and then determine which are moſt proper.

When there is nothing in the nature of the ſoil to determine what kind of ridges are moſt proper, then narrow ridges are to be preferred; for this reaſon, that a quantity of land in narrow ridges is ſooner ploughed than when in broad. It is obvious, that the two firſt furrows which the plough takes off from the ridge, are wider than any taken off afterwards, eſpecially if the plough begins in the furrow, as is frequently the caſe; ſo that the greater number there are of ridges, the field is the ſooner ploughed. Beſides, when ridges are broad, it is obvious, that the plough has more work, and muſt take longer time in turning, than when they are narrow. But then it is ſuppoſed that the ridges are ſtraight and equal. If they are not, the greater number there are of them, the greater is the trouble, and the more time is ſpent in ploughing. This, however, it muſt be owned, is of no great importance; becauſe it ſeldom happens, that the kind of ſoil does not determine what kind of ridges are moſt proper.

Having conſidered the kinds of ridges proper for land, according to its different ſituations; it is proper to inquire, whether there are any qualities which ridges ought to have, whatever is the ſituation of the land.

It will eaſily appear, that all ridges ought to be made ſtraight. Crooked ridges, it is obvious, are attended with ſeveral inconveniencies. In plowing them, the cattle are not always going exactly in the ſame direction with the plough; ſhort turnings are often neceſſary, as fields are generally bounded by ſtraight lines, or lines not crooked in the ſame manner with the ridges; and, when there is a ſmall deſcent, the water, as it runs in the furrows, meets with reſiſtance.

It is obvious, that when the plough goes in a curve, as it does in ploughing crooked ridges, the draught is not in the ſame direction with the beam, but is either to the right or left of it; and this gives the plough either too much or too little land.

It is obvious likewiſe, that, when ridges are crooked in a manner different from the lines by which a field is bounded, in ploughing the ridges upon the ſides, one part of them muſt be finiſhed before ſome other parts are near done; and thus ſhort turnings are neceſſary, which hurt the land much by the treading of the horſes.

It is obvious likewiſe, that, as a crooked furrow is continually altering the direction of the water, and has a leſs deſcent than a ſtraight furrow, the water, as it runs along it, muſt meet with greater reſiſtance, and thus penetrates the ſoil, and makes it more difficult to convey it away.

Theſe inconveniencies are removed by making the ridges ſtraight. For, in plowing ſtraight ridges, the cattle are always going in the ſame direction with the plough; no ſhort turnings are neceſſary, as fields can be made of an equal breadth in all places; and the furrows having a greater deſcent, the water meets with leſs reſiſtance, and is more eaſily conveyed away.

Straight ridges not only remove the inconveniencies with which crooked ridges are attended, but it is found that they are to be attended with no inconveniencies themſelves: they require indeed a little attention in the ploughman, which is itſelf an advantage; and therefore, upon all occaſions, are to be preferred.

As, in all kinds of ſoil, ridges ought to be ſtraight, ſo likewiſe they ought to be equal, equal one to another, and the ſame ridge equally broad in all places. Unequal ridges are attended with inconveniencies, as well as crooked ridges. It is difficult to ſow them with exactneſs; it is difficult to alter them, when neceſſary; and the plough muſt often turn in the middle of the ridge, which does great harm, by the treading of the horſes, or it muſt be driven empty to the end.

Theſe inconveniencies may be removed by making the ridges equal. Equal ridges may be ſown with greater exactneſs, and conſequently with leſs ſeed; it is eaſy to change them, one into two, or two into three, as occaſion requires; and the ſame furrow that finiſhes the ploughing of the ridge in one place, finiſhes it in all places; ſo that there is no neceſſity to turn the plough in the middle of the ridge, or to drive it forward the ſhorteſt ſpace, without turning up a furrow.

In many places of England and Scotland the ridges are ſtill crooked and unequal; and, in many places, they are much broader, and much higher raiſed in the crown, than the nature of the ſoil allows. Were the ridges altered, and the fields laid down in a proper manner, as the ſoil requires, it would be a great advantage. At the ſame time, it may be obſerved, that much harm is done, by proceeding in this matter with too much precipitancy. It is neceſſary,

ceſſary, therefore, that we conſider it as an affair of ſome importance.

It is neceſſary to obſerve, in the firſt place, that ridges muſt not be raſhly altered: on the contrary, great caution is to be uſed.

If the ſoil is very dry, ridges may be altered without great danger, though high; and they may be made ſtraight without being levelled. For, though the old furrows are ſtill lower than the reſt of the field, yet this is attended with no bad conſequences in dry land; and by degrees, they are filled up in ploughing. But then, it is to be obſerved, that there is not much land in Scotland, on which the ridges, at preſent, are high raiſed, in its nature ſo dry, as to allow this to be done.

If the ſoil is wet, the ridges cannot be made ſtraight till the ground is level, without great danger. For the water will lodge in the hollows of the old furrows, from whence it will not be poſſible to force it. Some perſons that make their ridges ſtraight before they are ſufficiently levelled, draw water-furrows along the hollows of the old furrows, to carry off the water that is apt to lodge there. This is of ſome uſe, but does not fully anſwer the purpoſe. A quantity of looſe earth, in ploughing, is thrown into the old furrows. The water, as it falls, penetrates this looſe earth, and is retained by it, notwithanding the water-furrows. Beſides, theſe water-furrows muſt be nearly cleaned out with a ſpade, and made deeper in the places where they are intercepted by the crowns of the new ridges, otherwiſe they are of very little uſe.

Before ridges can properly be made ſtraight, it is neceſſary therefore that the land be made as level as poſſible.

But it muſt be obſerved, that it is as dangerous to level ridges raſhly as to alter them before they are levelled: for if ridges are levelled too faſt, and thereby a great depth of looſe earth thrown ſuddenly into the furrows, it will not be poſſible to convey away the water that falls upon them. The water as it falls will ſink to the bottom, and there will lodge and chill the ſoil; and the earth thrown into the furrows being looſe, the cattle in ploughing muſt ſink to the bottom likewiſe, by which the land is very much poached.

It is recommended therefore to every perſon, ſeriouſly, to conſider the nature of the ſoil he has to deal with, before he proceeds to the altering old ridges; and if the ſoil is wet, to level the ridges very gradually. When the ſoil is deep, and inclining to be wet, and a ſufficient ſlope for carrying off the water, it is probable, that the loſs ariſing from the levelling ſteep and broad ridges ſuddenly, may exceed the profit of many years ariſing from the ridges being properly laid down; and therefore, if a view to incloſing makes it neceſſary to ſtraight the ridges, the levelling them ſhould be the work of ſeveral years. Even ſuppoſing that the ſoil is ſhallow, and the ridges raiſed ſo high, that there is nothing but graſs left in the furrows, yet ſtill it is improper to level the ridges too faſt, though levelling in this caſe is neceſſary.

In levelling ridges a great hollow is made in the crowns. This is occaſioned by frequent ſucceſſive cleavings, which is the method commonly uſed for levelling ridges. It is obvious, that by the firſt cleaving a hollow is made in the crown of the ridge equal to the depth and breadth of the furrow which the plough makes; whereas the parts on each ſide of the ridge are but little levelled, and at each ſucceſſive cleaving this hollow is made greater. Such a quantity of new earth immediately turned up, is not fit for vegetation. Beſides, this hollow becomes ſo great, and the parts of the ridge on each ſide of it become ſo ſteep, that it is impoſſible to plough them in a proper manner.

In this caſe, when levelling is ſtill thought proper, ſome furrows from each ſide muſt be thrown back by the plough into this hollow, by which a new ſmall ridge is formed upon the crown of the old one, and then the remaining parts of the ridge may be levelled as before. Some perſons, inſtead of this, plough acroſs the ridges. This method ſerves the ſame purpoſes; it both throws ſome earth into the hollows, and levels the ridges; for the plough in going carries off ſome earth from every height, and leaves ſome in every hollow. But then land muſt not be left in this ſituation during the wet ſeaſon, unleſs water-furrows are drawn along the furrows, and alſo in ſome caſes along the crowns; for unleſs this is done, the water that falls upon the field cannot be conveyed away. At the next ploughing, the whole old ridges may be levelled in the ſame manner as at the firſt ploughing; or, if thought more proper, may be divided into two equal ridges, ploughed in ſuch a manner that the furrow betwixt them may be exactly in the crown of the old ridge, and the other furrows exactly in the furrows of the old ridge. By this operation the old ridge is raiſed from the furrows, and levelled from the crown.

When a perſon is upon a ſcheme of levelling, this method of dividing the ridges into two will be found very proper, either when winter-grain is to be ſown, or when the barley-land gets the winter-ploughing.

Though land may be in ſuch a ſituation as to allow the ridges to be levelled with ſafety, yet unleſs it is remarkably dry, and in no caſe in danger of being damaged by too much water, the ridges ſhould not be altered, excepting when the land is ſummer-fallowed; and in that caſe, beſides the ploughing that alters the ridges, there ought to be another before the wet ſeaſon comes on, that ſo the bottom may be ſufficiently firm to reſiſt the water.

We have obſerved, that ridges ſerve to remove wetneſs, and to expoſe the ſoil to the influence of the air, and we have ſhown what kind is moſt proper for theſe purpoſes. But this is not enough; it is neceſſary likewiſe to conſider in what manner ridges ought to be placed. This is a matter of ſome conſequence: for, according to the poſition of ridges, water may be either conveyed away or retained; and ſome aſſert likewiſe, that by this the ſoil may be better expoſed to the influence of the ſun and wind. Theſe things therefore muſt be kept in view in the placing of ridges.

When the land is wet, as is often the caſe, it is certain that ridges ought to be placed with a view to the conveying away the water: but when land is dry, as is ſometimes the caſe, then ridges ſhould be placed with a view to the retaining the water.

The moſt common way of placing ridges where there is a ſlope, is along the declivity in a ſtraight line from the top to the bottom; and land is commonly laid out with a view to this. Where the declivity is gentle, this is, no doubt, a very proper way of placing the ridges; but if the declivity is great, this way of placing the ridges allows the ſoil to be waſhed away by the rain. It is obvious, that water, in running off of land, carries a part of the ſoil along with it, and the quantity is great, in proportion to the violence with which it runs. In climates where there are heavy

ſhowers

ſhowers of rain, the damage done by this is not inconſiderable. Therefore, in this caſe, placing ridges acroſs the declivity is the moſt proper way; for when ridges are placed acroſs, the water meets with many interruptions in its courſe, and does not run off with ſuch violence as when placed along from top to bottom, and therefore does not carry off ſuch a quantity of the ſoil along with it.

Inſtead of this ſome perſons make the ridges very narrow. This ſerves the ſame purpoſe; for in proportion to the number of furrows, there is the leſs water in each furrow, and conſequently it runs with leſs violence. However, placing the ridges in this manner is not ſo proper for this purpoſe as placing them acroſs the declivity, and, beſides, is not ſo proper for retaining the water in a dry ſeaſon.

When land is very dry, and in no danger of being damaged by the ſtagnation of water, the ridges ought to be placed acroſs the declivity, as near the level as poſſible; for this retains both the water and the ſoil. It is obvious, that when ridges are placed in this manner, the water cannot get off by running along the ſurface, by which the ſoil is in the greateſt danger of being carried away. As the furrows ſtop it in its courſe down the hill, it can get off in no other way than by penetrating the ſoil. By this a part of it is retained; what of it gets off is clear, and carries no ſoil along with it.

When land is dry at the head of the ridges, and wet at the foot, and no proper fall for carrying off the water, as is frequently the caſe, the ridges ſhould be placed in the ſame manner, directly acroſs the declivity. For, in this caſe, every furrow in ſome meaſure retains the water that falls upon the ridge above, and thereby prevents it from ſinking towards the bottom of the field, and lodging there. By this way of placing the ridges, the dry part of the field is rendered wetter, and the wet part of the field is rendered drier than otherwiſe they would be.

This is likewiſe a very proper way of placing the ridges, even when the declivity is but ſmall, if the land is in the ſituation mentioned, dry at the head, and wet at the foot. It muſt be owned, however, that this will not entirely anſwer the end propoſed: for the water will penetrate the ſoil; and when it is reſiſted by till or clay, will find its way along theſe to the bottom of the field. But this will not be ſo ſudden, as in the other way of placing the ridges: and the ſoil at the head, which is naturally dry, will receive more benefit from the rain as it falls.

When land is wet, and the water may be conveyed away from the bottom of the field, the ridges ſhould be placed acroſs likewiſe; not directly, but with a ſmall ſlope to a drain or furrow on the ſide of the field from top to bottom, by which the whole water is conveyed away. In this caſe every furrow becomes a drain to the ridge below, and prevents the water from running over it.

When land is wet from the breaking out of ſmall ſprings, this way of placing the ridges is alſo very proper. The furrows convey away the water as it riſes, and prevent it from doing any damage.

It is neceſſary to obſerve, that ridges placed in this manner, to ſerve theſe purpoſes, ſhould not be altered; for when the furrow is kept in one place, it is a more proper drain than when altered. When the furrows are kept in one place, the bottom is always firm, and the water runs eaſily along it; whereas, if changed, it may fall upon places of the field, where the ſurface, being raiſed by former ploughings, will prevent them from reaching the firm bottom. Beſides, if the ſprings break out in the furrows, by changing their place, they may break out in other parts of the ridge.

It is neceſſary to obſerve likewiſe, that ridges placed in this manner ſhould not be raiſed in the crown, but kept quite flat; that ſo, by the natural deſcent of the ground, the whole water that falls upon the ridge may be conveyed into the furrow below.

It was before obſerved, that ſome perſons aſſert, that, by a proper poſition of ridges, the ſoil is better expoſed to the influence of the ſun and air. Theſe perſons recommend the paying a regard to this. But it cannot be done excepting when the land is quite flat, and when the placing of the ridges makes no difference as to its wetneſs. However, as this is repreſented by thoſe perſons as important, ſome attention ſhall be given to what they ſay.

Some adviſe the placing the ridges ſouth and north; and the reaſon which they aſſign for this, is, that thereby the ſun may have an equal influence upon all parts of the ridge.

Others, again, adviſe the placing the ridges eaſt and weſt; and the reaſon which they aſſign, is, that they may ſhelter each other from the cold north wind.

Which of theſe advantages is the greateſt, is uncertain. It is even uncertain whether they can be called advantages at all.

It may be diſputed, whether, in the winter-ſeaſon, cold or heat is moſt beneficial to land. That heat is beneficial and cold deſtructive to plants, is certain. But cold poſſibly may be as proper as heat for preparing land for the nouriſhment of plants. It is allowed, that the coldneſs of the north wind is, in ſome meaſure, owing to the quantity of ſalts that it carries along with it. Theſe ſalts are beneficial to land; and therefore an expoſure to the north ſeems to be rather a benefit than a diſadvantage. This is confirmed from obſervation. The lands on the north ſide of riſing grounds are, generally ſpeaking, more fertile than thoſe on the ſouth-ſide. It is certain, that the richeſt lands in Scotland have this ſituation, and are expoſed to the north.

It may be diſputed likewiſe, whether the north or the ſouth ſide of an eaſt and weſt ridge has moſt benefit from the ſun in ſummer. It is not to be denied, that the rays of the ſun fall more directly on the ſouth ſide of the ridge; but then let it be obſerved, that the north ſide has the benefit of the ſun's rays in the mornings and evenings, when the ſun is ſo low, that the ſouth ſide is under the ſhade; which may poſſibly balance the loſs ſuſtained by the greater obliquity of the ſun's rays about mid-day.

Theſe things have been mentioned, to ſhow, that it is uncertain, which way of placing ridges expoſes the land beſt to the influence of the ſun and air; and therefore, that, in placing them, it is needleſs to have any view in this. When the placing of ridges makes no difference as to the wetneſs of land, then we are chiefly to have in view the conveniency of ploughing and laying out the land in proper breaks.

There are three different ways of ploughing ridges: gathering, caſting, and cleaving.

Gathering keeps the crown and furrows of the ridge in the ſame place in which they were before. The plough begins in the crown, and ploughs out the ridge, turning the earth towards the crown, where it entered. Every ridge is ploughed by itſelf; or, inſtead of this, the halves of two contiguous ridges may be ploughed together. By this method of ploughing, the ridge is higher raiſed than before.

before. It is obvious, that, as the earth on each ſide is turned upon the crown, and thrown up out of the furrows, the ridge is raiſed, both by making the crown higher, and the furrows lower.

Caſting keeps the crowns and furrows likewiſe in the ſame place, in which they were before. The ridges are ploughed in pairs. The plough may enter in the furrow betwixt the ridges, and plough out the ridges, turning the earth towards the furrow, where it entered. Or, the plough may enter in the furrow on the right ſide of the two ridges, then turn to the one on the left, and plough out the ridges, turning the earth to theſe furrows, and from the furrow that is betwixt them. By this method of ploughing, the ridges are kept of the ſame height in the crown, and one of the furrows made a little higher, and the other a little lower than before. The earth is taken from one furrow, and thrown into the other, and this is done alternately through the field. If this is reverſed at next ploughing, that is, the earth turned into the furrows from which it was taken at the former ploughing, thereby the ridges are preſerved in the ſame ſituation.

Cleaving is the reverſe of gathering. The plough enters in the furrow on the right ſide of the ridge, turns to the furrow on the left ſide, and ploughs out the ridge, turning the earth from the crown towards the furrows. Every ridge is ploughed by itſelf; or, inſtead of this, the halves of two contiguous ridges may be ploughed together. If the ridge is raiſed in the crown, by this method of ploughing it is made flatter. It is obvious, that, by this method of ploughing, earth is thrown into the furrows, by which they are made higher; and that earth is taken from the crowns, by which they are made lower. If the ridge is already flat, by this method it is changed, and the crown turned into the furrow.

When a field is laid out in the manner judged moſt proper, with reſpect to the breadth and height of the ridges, it ſhould be ploughed in one or other of theſe ways mentioned, according to its ſituation. If the ridges are broad and high, caſting will be found to be the moſt proper method of ploughing. For this is the only way by which they can be ploughed, and yet kept in the ſame ſituation: cleaving will make them flatter; and gathering will raiſe them higher. If they are flat and narrow, cleaving will be found to be the beſt method. Cleaving flat ridges, and thereby turning the crowns into furrows, and the furrows into crowns, has theſe peculiar advantages: a field is much ſooner ploughed in this way, than in any other; and a quantity of freſh earth, at every ploughing, is expoſed to the air, and employed in vegetation: and the ridges being kept level, are ſown with exactneſs. In no caſe gathering is proper, unleſs when the proper ſituation of the ridge renders it rather too wet for winter grain.

It may not be improper, in this place, to conſider a method of ploughing, uſed in ſome places, called ribbing. This method of ploughing is performed by making furrows about two feet diſtant from each other: one half of the ſurface is untouched by the plough, and the other half, which the plough turns up in making the furrows, is thrown on the top of what remains faſt. The land may be ploughed in this manner, either without regard to ridges; or the plough may be made to enter and turn, as it does in gathering, caſting, or cleaving; that is, a ridge may be ribbed in the way of gathering or cleaving; and two ridges may be ribbed in the way of caſting. This kind of ploughing is ſeldom practiſed, but in the beginning of winter, and upon land to be ſown with barley, after two more clean ploughings. It does not prevail ſo much as formerly, and is very much condemned by our modern improvers. But, however much it may be condemned, it certainly has its uſes. It keeps the land dry; the rain that falls is confined to the furrows, from whence the looſe earth is taken, and eaſily finds its way off. It facilitates the rotting of the ſtubble, by covering it and keeping it dry; it makes the froſt penetrate a greater quantity of the ſoil; and it alſo expoſes a larger ſurface to the influence of the air. Theſe things make this kind of ploughing, in ſome caſes, preferable to a clean ploughing.

There is alſo another method of ploughing called bouting. It is performed by throwing the earths of two furrows towards each other upon ſome faſt land. This is certainly an improvement upon ribbing, and better anſwers all the purpoſes of it.

By this method ribs are placed where furrows were before, and furrows where ribs were before; and the ſurface is entirely changed, what was above turned down, and what was below turned up. Theſe two ploughings may be performed with the ſame ſtrength, and in the ſame time with one clean ploughing; and, it is probable, that, upon trial, in ſome caſes, will be found more beneficial.

As a further improvement of this method of ploughing, it is propoſed to rib the land, and, at the ſame time, to plough it clean. This is done by throwing the earths of three or four furrows together in ſuch a manner, as to leave no faſt land below; and is the ſame thing with ploughing the land in ridges about three feet broad, from the middle of one furrow to the middle of the other. This ſerves all the purpoſes of the other kinds of ribbing, and, beſides, has theſe further advantages; the land being clean ploughed, weeds are more effectually deſtroyed, and the ſoil is better opened for receiving benefit from the froſt and air. This method may likewiſe be reverſed by another ploughing. The ſurface may be entirely changed, and the ribs turned into furrows, and the furrows into ribs.

Theſe different methods of ploughing, the laſt two excepted, are known to every common ploughman, and they ſhould be attended to by every improver as of importance; without a proper knowledge of them he cannot give directions to his ſervants, nor prevent them from falling into blunders in the execution, which they are but too apt to do. The ignorance of a maſter in things which his ſervants are acquainted with, is attended with bad conſequences; it gives them an indifferent opinion of his knowledge of farming, and makes them deſpiſe every new thing which he propoſes, as abſurd and whimſical.

It was obſerved, that ploughmen are apt to commit blunders in ploughing. Thus in gathering ridges, if care is not taken in beginning the ploughing of the ridge, ſome firm land will be left in the crown, and the crown itſelf ſo much raiſed above the reſt of the ridge, that no ſeed will lie upon it. It is ſometimes obſerved, that juſt on the crown of a ridge, where the ſoil is deepeſt, there is leſs corn, and more root weeds, than in any other part of the ridge. This is certainly occaſioned by allowing firm land to remain there in ploughing, and by raiſing the crown like a peak above the reſt of the ridge. The ploughman, inſtead of turning back the earth of the firſt furrow, and the firm land below it, keeps at ſuch a diſtance, as to lay the earth of the ſecond furrow up to it, or on the top of it. This leaves firm land betwixt the furrows, and raiſes the

crown of the ridge to a peak. But if he is directed to draw the furrows ſo near, as to turn back the earth of the firſt in making the ſecond, no firm land will be left, and the earth, that by the other method is thrown upon the crown, will be ſcattered.

This blunder is oftener committed when flat ridges are cleaved. In cleaving, if the ridges are ploughed out turning the plough always to the left, it is impoſſible to prevent the two furrows, laid together in the crown of the new ridge, from being at too great a diſtance, and raiſed higher than the reſt of the ridge. When ridges are cleaved in this manner, the earth of the firſt furrow that the plough makes, is turned over upon firm land, and backed by the earths of the other furrows in their courſe. This makes it impoſſible to get at this firm land in ploughing the next ridge, without turning up the firm land itſelf, and the earth of the furrow laid over it, upon the top of the earth of the ſecond furrow, by which the crown of the ridge would be raiſed to a high ſharp peak. Now, to prevent this, the ploughman, in ploughing the next ridge, keeps at a proper diſtance, and does not touch the firm land, over which the earth of the firſt furrow is laid. But it may be obſerved, that he muſt either keep at ſuch a diſtance as to leave firm land in the crown of the new ridge equal to the breadth of two furrows, or he muſt turn the earth of his furrow upon the top of the earth of that firſt furrow. By this the crown of the ridge is ſtill high raiſed, and ſome firm land ſtill left.

But ridges of this kind may be cleaved without leaving any unploughed land, or without raiſing the crown much above the reſt of the ridge. The method of doing it is this: after the plough has made the firſt furrow, inſtead of turning to the left, and making a furrow on the other ſide of the ridge, it turns to the right, and throws back the earth of its firſt furrow along with the firm land below it, and after going round again in the ſame courſe, turns to the other ſide of the ridge, and goes twice round in the ſame manner, after which the ridge betwixt the two fierings, as they are called, is ploughed out, as at firſt propoſed. When the ploughing of the ridge is finiſhed, a new fiering is made in the next furrow, by the plough going twice round, as before directed, and then the ridge betwixt the laſt made fiering and the ploughed land is ploughed out in the ſame manner as before; and in the ſame way the fierings are made till the whole field is ploughed. By this method there is no firm land left below the earth of the furrow; and the earth that is turned towards the crown being ſcattered, and not laid all in one place, the crown itſelf is not much raiſed above the reſt of the ridge.

It may be obſerved likewiſe, that in caſting ridges, if care is not taken, the furrow towards which the earth is thrown will be ſo filled up as to be improper for a drain. The plough enters the ridge near the furrow, and throws the earth towards it, turns to the right, and throws the earth from the oppoſite ſide towards it likewiſe; and then goes in the tract of the old furrow, betwixt the earths of the furrows made on each ſide. This furrow, towards which the earth is thrown, is ſometimes ſo filled up as to render it improper for a drain. We have ſhown how the earth around it is ploughed. The furrow which the plough makes going in the track of the old furrow, betwixt the earths of the furrows on each ſide, is called a gore-furrow. On the left ſide, the plough having no mould-board, the looſe earth falls back into the furrow behind the plough, and fills it up, or at leaſt makes it unfit for a drain, which in wet land is a great diſadvantage.

But this may be prevented by proper care; the furrow may be made clean, and fit for a drain. The method of doing it is this: the plough enters about two feet from the furrow, and inſtead of turning to the other ſide, returns on the ſame ſide, turning back the earth, and then goes round again in the ſame courſe; after this turns to the other ſide of the furrow, and does the ſame, going twice round. By this the gore-furrow is made quite clean, and, like the crowns of ridges, formed at about two feet diſtance on each ſide.

Some other things of a like nature might be mentioned. Theſe have been inſiſted upon, to ſhow, that it is neceſſary to attend to every circumſtance of ploughing, that ſo this important work may be performed in the moſt proper manner.

The chief deſign of harrowing land is, to ſmooth the ſurface. By this weeds are deſtroyed, and ſeed, if ſown, is covered.

Root-weeds, that are looſened by the plough, are ſometimes torn up by the harrow, and thus are deſtroyed. When this is the deſign of harrowing, the harrows ſhould go acroſs the ridges, or rather acroſs the way that the plough has gone. Becauſe, by going acroſs the earths of the furrows, the teeth of the harrow are apter to catch hold of the roots, than if it ſhould go in the ſame way with the plough.

Though the harrow may bring ſome part of the roots above ground, yet commonly ſome other parts continue below, which will grow if undiſturbed. This makes it neceſſary for perſons to follow the harrows, and gather all the roots which they obſerve brought up, and carry them off the field, or burn them.

If harrowing does not actually tear up the roots, it encourages their vegetation, by filling up the hollows, and thereby defending them againſt their greateſt enemy, the drought. On this account harrowing is improper for deſtroying root-weeds, excepting after a ſpring-ploughing, when the land is ſoon to be ploughed again for ſeed. For at this ſeaſon the drought is ſeldom violent, and it has not time to operate in the deſtruction of the roots; and therefore whatever the harrows bring out is ſo much deſtroyed.

The ſame things that make harrowing improper for deſtroying root-weeds, make it very proper for deſtroying ſeed-weeds. The ſmoother that the ſurface is made, and the more effectually that the mould is broke, the ſeeds near the ſurface are the more expoſed to the air, and the ſap, which is in the land, the more effectually retained. Both theſe are neceſſary to promote the vegetation of the ſeeds; and they muſt vegetate before they can be deſtroyed. But harrowing not only promotes the vegetation of the ſeeds of weeds, but alſo deſtroys the young plants when ſprung up; ſo that one ploughing, if the ſeaſon is favourable, and ſoil allows, may be attended with ſeveral harrowings, and thereby ſeveral crops of weeds deſtroyed.

If land riſes in hard clods, the harrow makes but little impreſſion; at leaſt before the clods are broken, the land is made ſo firm by the treading of the horſes, and the weight of the harrows, as to render the work uſeleſs, and ſometimes deſtructive. Great care ſhould therefore be taken to prevent land from being brought to this ſituation. If land once riſes in hard clods, it is vain to expect to break them with the harrow, ſo as to cover the ſeed. Unleſs the

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ſeaſon is very wet, it will remain in this ſituation through the ſummer, and afford but little nouriſhment for the crop. Sometimes it will remain in this ſituation after men have attempted to break the clods with malls.

If the ſoil is light and ſpungy, it can ſcarcely get too much harrowing; for the more that it is harrowed, it becomes the firmer. But if the ſoil is ſtiff, the leſs harrowing it gets the better, if the purpoſes propoſed are anſwered. The effects of harrowing are in this caſe contrary to thoſe of ploughing. Ploughing renders ſtiff ſoil more free and open, but harrowing renders it ſtill more firm and ſolid.

The ordinary way of harrowing after ſeed is ſown, is firſt along the ridges, then acroſs, and then along again. If ridges are flat, they may be harrowed either along or acroſs; and the work may be begun or ended either way. But if the ridges are ſteep, it is improper to begin by harrowing acroſs, becauſe thereby too much of the ſeed will be drawn into the furrows. If the ridges are very ſteep, for the ſame reaſon, it is improper to harrow acroſs at all. For another reaſon it is thought improper to harrow acroſs ridges when the land has been ploughed immediately out of lea or graſs. In ploughing this kind of land, the ſward is for the moſt part turned over whole; ſo that when the harrow goes acroſs, inſtead of tearing the ſward, it is apt to turn it back into the furrow from whence it was taken. When ridges are gathered or caſt, this will probably happen. In caſting, the earths of the furrows on one ſide of the ridge are turned towards the crown; and, in gathering, the earths of the furrows on both ſides are turned the ſame way; and therefore the harrows, when drawn from the crown to the furrow, are apt to take hold of the unbroken ſward, and turn it back. But this does not ſo readily happen when the ridge is cloven. Becauſe in cleaving, the earths of the furrows on both ſides of the ridge being turned from the crown, the harrows, in going up from the furrow, are not in ſuch danger of turning them back. In ploughing lea, the earths of the furrows are ſometimes placed as exactly as poſſible upon their edge, that ſo they may be the more eaſily torn by the harrows. When theſe are turned to the crown, they do not ſupport each other; and are therefore eaſily turned back by the harrow, in going from the crowns to the furrows: but when the earths are turned to the furrows, ſo they ſupport each other by their weight; and therefore are not ſo eaſily turned back by the harrows in going up from the furrows to the crowns.

Rolling of land is practiſed with ſucceſs, both on land lying in graſs and on land in tillage. It is of advantage to land in graſs, by preſſing down mole-hills and mole-runs. Some ſay, that it alſo deſtroys fog.

When land is laid down in graſs for hay, rolling is of uſe in ſmoothing the ſurface; and, when laid down in graſs for paſture, it makes the graſs ſtool, or tiller, and grow thicker.

There is a kind of land, which, when clover is ſown upon it, throws out the young plants after froſt. Rolling, in the beginning of winter, and immediately after the froſt is gone, it is ſaid, will, in ſome meaſure, prevent this. The firſt rolling prevents the froſt from penetrating ſo deep, as otherwiſe it would do; and the ſecond makes the land firm, after having been looſened by the change from froſt to open weather.

Rolling may alſo be uſed with advantage upon land in tillage. When the land is naturally ſtiff, and may be reduced by the harrow, rolling is very improper: for it makes this kind of land ſtill firmer than the harrow does. But if the land riſes in clods, which the harrow does not reduce, rolling is very proper; for it ſmooths the ſurface, and breaks the clods, more effectually than harrowing.

When the land is light and ſpungy, the roller ſhould always be applied after ſeed is ſown; for it is ſcarcely poſſible to make this land too firm.

It was obſerved, that, to deſtroy root-weeds, land ſhould be made rough, and raiſed in as large pieces as poſſible; and that it ſhould be allowed to lie for ſome time in that ſituation. Rolling, after this, is of great uſe; for, without it, if the weather continues dry, it will not be poſſible to make the land fit for receiving another ploughing.

If the land is ſoft below, and ſome hard clods upon the ſurface, which the harrow does not break, rolling may be uſed with ſome advantage: for, beſides ſmoothing the ſurface, it will break ſome of the clods; and ſuch of them as are preſſed down, will be diſſolved by the natural fermentation of the ſoil, if in good heart.

Sometimes in ſtiff land, ploughed dry, after a former wet ploughing, or when, by any accident, it has been much trod upon, the whole riſes in hard clods, which the harrows cannot break, ſo as to cover the ſeed. In this caſe rolling is of great uſe. It bruiſes ſome of the clods; and, when followed by the break-harrow, theſe clods are raiſed up and broken. Though rolling ſhould do no ſervice but ſmooth the ſurface, yet, on that account, it ſhould be practiſed. For when the ſurface is ſmooth, the corn may be cut down more expeditiouſly than when it is rough and uneven. When graſs-ſeeds are ſown for hay, it is abſolutely neceſſary to ſmooth the ſurface: the roller is moſt proper for this. Some uſe it before, and ſome after ſowing. When it is uſed before ſowing, the ſeed is more equally ſcattered.

Graſs-ſeeds muſt be ſown in ſuch a manner as to lie near the ſurface; otherwiſe they will not vegetate. The making the land firm by rolling is therefore an advantage, as, by it, the ſap is better preſerved; and this does not ſo much damage to graſs as to corn, for the ſeveral kinds of it are commonly better foragers.

But however all the operations of ploughing, harrowing, and rolling are performed, ſomething will be ſtill wanting to promote vegetation, and this want is effectually ſupplied by certain ſubſtances called manures. To apply theſe ſubſtances in ſuch a manner, as moſt effectually to promote vegetation, it is of importance to know their natures, and the ways in which they operate. This is the more neceſſary, as, without it, we eannot know how to apply them in the moſt proper manner to the different ſoils.

Manures operate, by communicating to the ſoil with which they are mixed, the vegetable food which they contain; by communicating to it a power of attracting this food in greater plenty from the air: by enlarging the vegetable paſture which it contains; and by diſſolving the vegetable food which it is already poſſeſſed of, and fitting it for entering the roots of plants.

Manures are very different in their natures. Some of them operate in all the ways mentioned; and there are none of them that do not operate in more ways than one.

Great miſtakes have ariſen from ſuppoſing that manures operate only in one way. None have been attended with greater loſs, than ſuppoſing that they ſerve only to divide the ſoil, and that tillage may be ſubſtituted in their place.

This is Mr. Tull's opinion, and is, indeed, the fundamental principle of his horſe-hoeing huſbandry.

Before one changes the ordinary practice of agriculture, in ſo important a point as baniſhing manures from his fields, the good effects of which are ſo obvious; he muſt be certain, that the principle which determines him to ſo important a change, is itſelf well founded.

Mr. Tull has endeavoured to prove, that earth is the food of plants; and hence infers, that to divide the earth into minute particles, by which it is fitted for entering their roots, is all that is neceſſary in agriculture: and this, he aſſerts, may be done by tillage, without manures.

When treating of the food of plants, we have attempted to ſhew, that other principles, beſides earth, are in the compoſition of this food: and, if this is true, the want of manures, which provide theſe other principles, cannot be ſupplied by tillage.

But ſuppoſing we allow, with Mr. Tull, that earth is the food of plants, yet ſtill it does not follow, that tillage may ſupply the place of manures. It is certain, that every particle of earth which we obſerve, is not of the kind that is the food of plants. Every ſoil is a compoſition of different earths; ſeveral of which, it is obvious, are not of this kind.

The great difference in ſoils equally pulveriſed, is a plain and convincing evidence of this. Now, let it be obſerved, that the earth contained in dung is of this kind; it has already been food to plants, and therefore though all that is contained in the greateſt quantity of dung laid on at one time, is but ſmall in proprotion to the quantity of ſoil employed in vegetation, as Mr. Tull juſtly obſerves; yet it may be conſiderable in proportion to the quantity that is really the food or pabulum of plants. If the quantity of earth contained in the quantity of dung commonly laid on at one time, is compared with the quantity of earth contained in the rich crop, it will be found ſeveral times larger; and therefore, by the laying on of this dung, food is provided for ſeveral good crops.

Beſides, let it be obſerved, that the mechanical action of the plough cannot increaſe the number of the particles by which plants are nouriſhed; they are ſo ſmall as not to be obſerved in water. Mr. Tull ſuppoſes, that they are as ſmall as thoſe upon which the colour of bodies depends. Now, though pounding earth in a mortar may perhaps do ſomething to increaſe them, yet the action of the plough can never be ſuppoſed to do it. The plough can do no more than open the ſoil, or enlarge the paſture of plants, and allow them to extend their roots in ſearch of their food, but does not increaſe the quantity of it; and therefore tillage cannot ſupply the place of dung, which not only opens the ſoil by its fermentation, but alſo increaſes the vegetable food by the earth which it contains.

It may further be obſerved, that the fermentation raiſed by dung continues for a conſiderable time; ſo that though, by ploughing, the ſoil may be as completely divided as by the fermentation of dung, yet it will not continue ſo: for after ſeed is ſown, the artificial paſture raiſed by ploughing is continually decreaſing while the crop is growing; whereas the artificial paſture, raiſed by the fermentation of dung, is continued by the continuance of this fermentation; and therefore, though in the horſe-hoeing huſbandry the want of dung may be ſupplied by hoeing, yet, as Mr. Tull indeed obſerves, dung is ſtill neceſſary in the old huſbandry.

If perſons attentively conſider the effects of manures, it will appear that they operate in all the ways mentioned.

Manures are found to enrich the beſt pulveriſed ſoil, and to do this again and again, after it is exhauſted by crops. It is alſo an univerſal practice in Scotland, to lay dung upon land that is kept conſtantly in tillage once in three, four, or five years. It is obſerved, that after the dung is laid on, the land becomes rich, and that the crops turn gradually worſe and worſe, till the whole virtues of the dung are exhauſted; and it is alſo obſerved, that immediately upon the dung being again applied, the land becomes rich as before. It is natural to conclude from this, that dung promotes vegetation by increaſing the quantity of the vegetable food.

It is found, that ſome manures loſe part of their virtues by being long expoſed to the air. After dung is ſufficiently rotten, the longer that it lies it becomes of leſs value, and does not enrich ſo large a quantity of land as when uſed in proper time. The dung of cows dried upon their paſture, gathered, and laid upon other land, is ſcarcely to be diſcerned in its effects on the crops produced: the ſame quantity applied, whether carried from the byre, or by folding the cattle, enriches the land. From this it is obvious, that this kind of manure contains the vegetable food in itſelf, and does not receive it from the air.

It is found, that ſome manures operate the ſooner, and with the greater violence, the longer that they are expoſed to the air before they are uſed. Lime and marles are of this kind; the longer they lie expoſed, they operate the ſooner; and it is obſerved, that they have a ſtrong power of attracting the virtues of the atmoſphere. From theſe things it is reaſonable to infer, that theſe manures operate, by communicating to the ſoil with which they are mixed, a power of attracting the vegetable food from the air.

It is obſerved, that ſome manures exhauſt land of its vegetable food, and do not reſtore it again when immediately applied. This is found to be the caſe with lime. Land thoroughly limed has been found to carry many very good crops: by degrees however the virtues of it have been exhauſted, and the land reduced to a worſe ſituation than before the lime was laid on. In this ſituation lime has been applied a ſecond time, but its effects found to be far inferior to what they were when firſt applied. This is ſufficient to convince us, that this manure operates by diſſolving the vegetable food which it meets with in the ſoil, and fitting it for entering the roots of plants.

It is certain, that all kinds of manures open the ſoil. Any perſon will be convinced of the truth of this, who will take the trouble to compare a piece of land, on which dung, or any other manure has been laid, with a piece contiguous that has not been manured; he will find the one much ſofter, much more free and open than the other. It muſt be allowed, therefore, that all manures operate by enlarging the vegetable paſture.

Manures are commonly divided into claſſes. Some divide them into natural and artificial; others divide them into the foſſil, the vegetable, and the animal; and treat of them in order, as belonging to each of theſe claſſes.

The manures belonging to ſome of theſe claſſes, differ both in the nature and operation from thoſe in the other claſſes. Some of them likewiſe differ from others in the ſame claſs. The dividing them into claſſes, therefore, ſerves no purpoſe. All that is neceſſary is, to treat of the different particulars which the farmer can command, without conſidering to what claſs they belong.

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The manures generally procured are dung, marles, aſhes, ſoot, ſea weed, ſhells, ſown vegetables, and water.

There are ſeveral other things that are very rich manures, ſuch as rags, leather, &c. But as theſe are to be procured only in ſmall quantities, it is needleſs to treat of them ſeparately.

Dung is commonly uſed to ſignify not only the excrement of animals, but alſo all rotten vegetables, when uſed as manures.

Dung is the food by which animals are nouriſhed, reduced to a corrupted ſtate. The ſtomach diſſolves the food of the animal, and reduces it to a ſtate of putrefaction much ſooner than is done by the air. It is by being in this ſtate of putrefaction that the juices fit for the nouriſhment of the body are conveyed by the guts into the blood. While bodies are in a ſound ſtate, their parts adhere firmly together, and they are incapable of being turned into the parts of other bodies. To render them capable of this, they muſt be reduced to their firſt principles. This is done by corruption. It is obſerved, that by corruption all the parts of bodies are relaxed, and the ſalts, oils, and other juices which they contain, from being fixed, are made volatile. It is by being reduced to this ſtate in the ſtomach, that the things which the animal feeds upon become nouriſhment to it, and are turned into parts of its body.

All the juices contained by the things which animals feed upon, are not exhauſted by the guts; many of them, along with the earthy part of the food, are thrown out. There is no doubt that ſome of the earthy part of the food goes alſo to the nouriſhment of the animal; but as the earth is rendered volatile by the ſalts and oils, there muſt be but a ſmall quantity of it in proportion to the quantity of theſe exhauſted by the animal; and therefore in the dung there muſt be a great quantity of each in proportion to the other principles. However, as the dung contains all the principles of the food, we may conſider the dung of thoſe animals that feed on vegetables as vegetables in a putrefied ſtate.

Of the ſame nature is the dung of animals that feed upon other animals. Vegetables are the original food. All animals either feed on pure vegetables, or on other animals that feed on vegetables. Animals that feed on vegetables are made up of the ſame things with vegetables, only under a different form; and therefore the dung of animals that feed upon theſe, is ſtill to be conſidered as vegetables in a putrefied ſtate.

Chemiſts inform us, that dung is compounded of the ſame principles of which vegetables are compounded, of water, air, oils, ſalts, and earth. The earth which it contains is of the abſorbent kind, and attracts the other principles. They alſo inform us, that dung attracts and ferments with acids, and by this fermentation produces ſalts. A quality of ſalt, as was before obſerved, is to attract and diſſolve oils, and make them capable of being mixed with water.

If theſe qualities of dung are conſidered, it will appear that it promotes vegetation in all the different methods before-mentioned.

It promotes vegetation by increaſing the vegetable food. It is compounded of the ſame principles of which the vegetable food itſelf is compounded, as we endeavoured to ſhew, when treating of the food of plants. This is alſo confirmed by the experience of all places and of all ages; and it is what no perſon will doubt of, who conſiders that it has the ſame effects upon land of all kinds, and in all ſituations.

It promotes vegetation by enlarging the paſture of plants, it attracts acids from the air and ſoil; and by raiſing a fermentation with them, thereby ſeparates the particles of the ſoil with which it is mixed. Every farmer knows the truth of this from experience. The land upon which dung is laid, though naturally ſtiff, becomes ſoft and mellow, and is more eaſily ploughed than before.

Dung, we have ſaid, enlarges the paſture of plants, by attracting acids, and fermenting with them. Theſe acids are in the ſoil and air. They are in the ſoil; for the ſoil produces acid plants. Chemiſts tell us, that the natural ſalt found in ſoil is compounded of an alkaline ſalt, ſuch as is found in vegetables, and an acid ſpirit. All alkalis are ſtrong attractors of acids, ſo that, in the proceſs of an experiment upon ſoil, perhaps it may be difficult to keep them ſeparate, though they may exiſt ſeparate in it. The acid plants prevent theſe from mixing; or, perhaps, have a ſtronger power in their veſſels to ſeparate them, than other plants have.

But though there may be no acids in ſoil, excepting in the compound of neutral ſalts, yet there is no doubt, but they are in the air. Chemiſts find this by innumerable experiments. Aſhes, when expoſed to the air, produce neutral ſalts; the application of acids has the ſame effects. Any perſon may obſerve a ſalt adhering to the lime of old walls; this ſalt is not in the lime, it is produced by the air. The ſame ſalt is produced by acids. Other experiments might be mentioned, but theſe are ſufficient.

Dung promotes vegetation, by communicating to the ſoil a power of attracting the vegetable food from the air. The earth which it contains, is of the abſorbent kind, and attracts all the other principles of the vegetable food; and the ſalts which it contains and produces, attract oils.

It likewiſe promotes vegetation, by preparing the vegetable food for the nouriſhment of plants. By the ſalts which it contains and produces, it not only attracts oils, but alſo diſſolves them, and makes them capable of being mixed with water. It is probable, that oil is a principal part of the food of every plant which we cultivate in our fields, at leaſt is the ingredient of which it is eaſieſt to exhauſt the ſoil, and which it is moſt difficult to reſtore to it again. *In proportion to the quantity of oil contained* in any plant, in proportion it robs the ſoil by which it is nouriſhed of its vegetable food. But the nature of oil muſt be changed before it can enter the roots of plants. This change is made by ſalts; they diſſolve it, and make it to mix with water.

Though dung promotes vegetation in all theſe ways mentioned; yet, as there are other bodies, that are much ſtronger attractors of acids, by which many of its effects are produced; it is probable, that it principally operates by increaſing the food of plants. Its effects in diſſolving the vegetable food in the ſoil, muſt be very trifling. The ſalts which it contains and produces, having its own oils to work upon, and being along with them conveyed into the roots of plants, cannot operate with any violence upon the oils which the ſoil contains. This is confirmed by experience. When the virtues of dung are exhauſted, the ſoil is no poorer than before it was laid on.

Some new improvers are pleaſed to ridicule the old farmers, becauſe they are ſo fond of dung; but none will do this who attentively conſider the virtues of it. Such other manures as can be obtained, are to be uſed; and tillage is carefully to be attended to: but none of theſe are

to ſuperſede the uſe of dung, which can be employed to ſo great advantage.

Though dung in general has all the qualities mentioned, yet there are ſome kinds of it poſſeſſed of ſome of theſe qualities in a higher degree than others. There are as many kinds of dung as there are of animals, and in ſome reſpects they all differ one from another.

The difference betwixt one kind of dung and another, is commonly ſuppoſed to ariſe from the different food of the animals. Green herbage, ſtraw, or hay, do not contains ſo much vegetable food in the ſame quantity as grain does. Hence it is ſuppoſed, that the dung of cows is not ſo rich as that of horſes, nor the dung of horſes ſo rich as that of fowls.

But this difference muſt partly ariſe likewiſe from the nature of the animals, if it is true, that the dung of horſes, cows, ſheep, hogs, and geeſe, all differ one from another, though fed upon the ſame paſture. Some animals digeſt their food more quickly than others. This makes a difference in the dung produced by the ſame food. Some things are digeſted, and turned into a ſtate of corruption by ſome animals, that paſs through others ſound and undiſſolved. The matter then in the ſtomach that digeſts the food, muſt be different in the different animals. The dung muſt partake ſomething of the nature of this, which makes another difference in the dung produced by the ſame food.

Some writers in agriculture treat of the dung of the different animals ſeparately. But it is needleſs to do this; for it requires more pains and expence to keep them ſeparate, and uſe each of them by itſelf, than all the advantages ariſing from this way, above the ordinary way, can poſſibly amount to.

The dung of fowls, particularly of pigeons, is an exception to this. It is commonly uſed without any mixtnre, and it can be kept ſeparate from other dung without any trouble or expence. It is obſerved, with reſpect to it, that the effects of it are more violent, and ſooner over, than the effects of common dung, The effects of ſome other kinds of dung would perhaps be the ſame, if they were uſed without any mixture. The pigeons dung being thoroughly corrupted ſoon diſſolves, and becomes vegetable food. But the ſtraw, with which the other kinds of dung are commonly mixed, not being ſo thoroughly corrupted, prevents the effects of them from being ſo violent, and ſo ſoon over.

The way in which pigeons dung operates, points out the manner in which it ſhould be applied. As it is very rich, and its qualities ſoon exhauſted, a very ſmall quantity ſhould be applied in proportion to the quantity of other dung. If care is not taken of this. the crop will be deſtroyed by being too luxuriant. Perhaps, mixing it with ſome other things may have good effects. The ſtrewing ſmall chaff of any kind, from time to time, on the bottom of the pigeon houſe, is very proper. The chaff ſucks up the moiſture, and makes it eaſy to reduce the dung to powder, which is an advantage: for thereby the dung is ſcattered more equally, and manures a greater quantity of land.

It is a cuſtom in ſome places, to fold ſheep and cattle, for the ſake of their dung; which, in this way, is uſed without any mixture. Some writers on huſbandry give particular directions how to do this in the moſt advantageous manner. But it is needleſs to conſider theſe. The farmer muſt conſult the advantage of his ſheep and cattle, and not the advantage of the land by the dung; and, therefore, muſt fold them in the moſt convenient manner. A ſcore of ſheep, with the beſt management in folding, will not produce much more than ten ſhillings worth of dung, in the ſeaſon, above the expence of folding; a ſum ſoon loſt by an injudicious management of them.

Dung is commonly mixed with vegetables, and allowed to lie for ſome time before it is uſed.

Straw is thrown below the cattle, and this is carried out along with the dung, and thrown upon the dunghill. On the dunghill is alſo thrown all the ſtraw that is left after ſerving other purpoſes, and all the refuſe of vegetables and animals, uſed in the farmer's family.

In the management of dunghills, two things are always to be kept in view: the promoting putrefaction; and the preventing the vegetable food from flying off into the air, or being conveyed away by water. The ſtraw and other parts of uncorrupted vegetables, of which the dunghill is compounded, make it neceſſary to keep the firſt in view; and the ſalts and oils, which by corruption are rendered volatile, and the water, which extracts the virtues of dung, make it neceſſary to keep the laſt in view.

To promote putrefaction, the ſituation of the dunghill ſhould be dry, and the dung laid together as thick as is convenient. Putrefaction, indeed, cannot be promoted without water: but the quantity that falls in rain, with the natural ſap of the dung, is ſufficient for this purpoſe. Too much water prevents that fermentation, which carries on the proceſs of putrefaction moſt quickly. This is confirmed by experience. If there is any part of a dunghill ſoaked with water, it is obſerved that the ſtraw is quite ſound, while, in other parts that are dry, it is completely rotten.

To promote putrefaction, the dung ſhould be laid thick together; thereby the heat is the ſooner generated, that produces the putrefaction; and thereby the natural ſap is the better preſerved, which prevents the dung from being burned.

When the natural ſap of the dung is exhaled, and the dung afterwards covered, the heat is in danger of riſing to ſuch a height, as to burn the dung. This muſt be carefully guardeſt againſt: for when the dung is burned, its ſtrength is exhauſted, and it is rendered almoſt uſeleſs. Dung, in this ſituation, is dry and white; the ploughmen call it fire-fanged. When thus burnt, it is found, from experience, that it has loſt almoſt all its virtues. To prevent the dung from being reduced to this ſituation, when it is carried out of the ſtable or byre, particularly if there is much ſtraw in it, it muſt not be laid in heaps, which makes it dry too faſt, but carefully ſpread thick upon the top of the dunghill. This prevents the ſap from being carried off by the wind, and thereby prevents the heat from being raiſed to ſuch a height as to burn the dung.

It may be obſerved, that, when graſs is cut green, and immediately thrown into a heap, it heats, and this heat ſoon reduces the graſs to a ſtate of putrefaction. But, if the graſs is for ſome time expoſed to the air, and then put together without being ſufficiently dry, it heats alſo; but, inſtead of being reduced to a ſtate of putrefaction, is burned. So it is with dung: if, when carried out, it is laid in ſmall heaps, being thereby too much expoſed to the air, it loſes its ſap; and, being afterwards covered, the heat is raiſed to ſuch a height, as to burn it: but if it is ſpread thick upon the top of the dunghill, it retains the ſap, and putrefies.

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A diſtinction is here made betwixt dung putrefied and burned; and this diſtinction is repreſented as important. We know not if the chemiſts make any ſuch diſtinction. A late author ſays, that the greater part of what remains of dung, after the putrefaction is completed, ſeems to be earth, and a fixed alkali. Theſe things, we apprehend, make up the greater part of what remains, when dung is what we have called burned; but when it is only putrefied, it contains alſo ſalts and oils. But though chemiſts ſhould make no ſuch diſtinction, it is abſolutely neceſſary that the farmer do it: for, when the dunghill is allowed to heat to ſuch a degree, as to burn the dung, the value of it is thereby greatly leſſened.

To prevent the vegetable food from being conveyed away, no foreign water, excepting what falls in rain, muſt be allowed to run into the dunghill; and the ſituation of the dunghill, if poſſible, ſhould be high at the ſides, and hollow in the middle. When foreign water is allowed to run into the dunghill, the fermentation is not only ſtopped, but, as it is often neceſſary to allow the water a paſſage from it, thereby much of the vegetable food is conveyed away. When the bottom of the dunghill is quite level, the rain, which ſometimes falls in heavy ſhowers, eaſily finds its way off; but this is prevented by making it high at the ſides, and hollow in the middle.

The only way to prevent the vegetable food from being exhaled by the ſun, or carried off by the wind, is to cover the dunghill. The covering rhe dung would certainly be an advantage, if it could be eaſily executed. If it was not for the additions that are daily made to it, earth would be very proper for this purpoſe. Some perſons aſſert, that by covering the dunghill, it would loſe the influence of the air; and it is the air alone, they ſay, that makes it fit nouriſhment for vegetables; and, therefore, recommend the expoſing it, particularly to the north and north-eaſt; becauſe the wind from theſe points brings along with it more aereal nouriſhment than from the others. If the dunghill contained no vegetable food but what it received from the air, this direction would be very proper; but as the dunghill contains in itſelf all the ingredients of the vegetable food, and as its juices, the more it is putrefied, become the more volatile, the vegetable food in it by being expoſed to the air, inſtead of being increaſed, would be diminiſhed. The covering the dunghill, therefore, would be an advantage. But the difficulty lies in executing this.

Some propoſe to dig a large pit, lay the bottom with flags, build up the ſides with ſtones, and cover it with a roof. This, it muſt be owned, will retain the juices, and promote corruption, as well as prevent the vegetable food from being exhaled. But then it muſt be ſo expenſive, that few will be engaged to make trial, unleſs the benefits are more obvious than the aſſertions of the contrivers make them: and, beſides the expence, it muſt likewiſe be attended with inconveniencies. In ſome ſituations, it will be very difficult to prevent too much water from getting into it; and as difficult to get the dung itſelf carried out.

The method which we propoſed for preventing the dung from over-heating, will alſo, in a great meaſure, ſerve this purpoſe. The dung, when it comes from the ſtable or byre, is mixed with ſtraw, which abſorbs the juices, and prevents them from flying off, till the ſtraw itſelf begins to putrefy. When, in this ſituation, it is laid thick upon the top of the dunghill, a ſmall ſurface only being expoſed to the air, and being covered before the ſtraw begins to putrefy, the juices, in a great meaſure, are preſerved. A perſon, by the ſmell, is ſenſible that the juices of the dung are not ſo volatile, when firſt laid upon the dunghill, as after they have been covered for ſome time, and then expoſed to the air.

Dung, expoſed to the ſun and wind, or waſhed by rain, loſes its vegetable food; it ought, therefore, to be ploughed in as ſoon as is poſſible, after it is laid upon land. Some perſons aſſert, that they have found from experience, that dung is nothing worſe, though it lie a conſiderable time ſpread upon land, in dry weather, before it is ploughed in. This, if true, is contrary to what has been ſuppoſed, that the vegetable food is exhaled by the ſun, and carried off by the wind. It is probable, that, after dung is ſpread upon land, its fermentation ceaſes, and the ſalts and oils remaining in it may become fixed, and may continue ſo till a new fermentation is raiſed by mixing the dung with the ſoil; and that, by attracting acids from the air, more ſalts may be formed. By theſe its effects will be more ſudden and violent, but ſooner over.

It may be proper alſo to obſerve, that as the juices contained in the dung are waſhed downwards by the rain, it ſhould be ploughed in with a very ſhallow furrow; excepting when the dung is not ſufficiently rotten. In this caſe it requires a deeper furrow to cover it.

The better that dung is mixed with ſoil, the purpoſes of vegetation are the better anſwered; all parts of the ſoil receive equal benefit, the vegetable food is equally diſtributed, and in all parts the fermentation equally promoted. When dung then is laid on land, it ought to be ſpread as equally as poſſible. This likewiſe prevents the breeding of vermin, which happens in ſome ſoils, when the dung is left in too large pieces.

Some are of opinion that lime is only a ſtimulus, that is, that it promotes vegetation, only by making the ſoil with which it is mixed, exert itſelf. Others, that it promotes vegetation by enriching the land, and adding to the quantity of vegetable food.

They firſt ſupport their opinion by obſerving, that the crops which lime enables land to produce, exhauſt it in a remarkable manner. It is a certain fact, that land thoroughly limed, may be reduced to a much poorer condition by cropping than land can be reduced to, that is not limed. It is poſſible to reduce limed land almoſt to a *caput mortuum*; and the better and the oftener the land is ploughed, this is done the ſooner.

The other opinion is ſupported by obſerving, that, in ſome places, lime is applied regularly once in four or five years; that the land ſeldom gets any other manure: that it is kept almoſt conſtantly in tillage; and with the aſſiſtance of fallowing, carries very good crops.

From theſe obſervations, one is led to conclude, that lime acts both ways; not only makes land exert itſelf in the nouriſhment of vegetables, but alſo enriches it, and adds to the vegetable food.

An inquiry into the qualities of lime will probably illuſtrate this.

Chemiſts tell us, that lime has the following qualities.

It is a great diſſolver of all animal and vegetable ſubſtance: it is a very heavy body: it is an attracter of acids; with theſe it raiſes a fermentation, and produces ſalt; and it communicates its virtues to water.

When theſe things are conſidered, it will appear, that lime promotes vegetation in the ways following.

It communicates to the ſoil a power of attracting the vegetable food from the air. It attracts the acids from the air and ſoil; theſe it converts into a neutral ſalt, by which oils are attracted from the air. This operation of lime is confirmed by the experience of thoſe who uſe it as a manure once in four or five years.

Lime enlarges the vegetable paſture. By its weight it penetrates the ſoil; and, by its fermentation with acids, it ſeparates its particles.

This operation of lime is obvious to every perſon that views with attention any land that is thoroughly limed. It appears ſoft and mellow, and obviouſly in a ſtate of fermentation.

Lime diſſolves the vegetable food, and fits it for entering the roots of plants. It diſſolves all the animal and vegetable ſubſtances which it meets within the ſoil, and converts them to vegetable food; and, by the ſalts which it produces, it diſſolves all oily ſubſtances in the ſoil; and conveys them into the roots of plants. We find from experience, that lime clears land of root-weeds. This it does by its diſſolving power. Root-weeds, when torn up by the plough, have their growth checked, and are for ſome time in a languiſhing condition: if lime is applied to their roots while in this ſituation, by its diſſolving power, it is apt to deſtroy them.

That it is owing to the ſalt which lime produces by its attracting and fermenting with acids, that it chiefly owes its power of promoting vegetation, is confirmed by this obſervation. The lime of old walls which has bean long expoſed to the air, and where the ſalt is already formed, is much more ſudden in its operations, when laid upon land, than quick lime.

It has been obſerved, that lime promotes vegetation by communicating to the ſoil a power of attracting the vegetable food from the air, by enlarging the vegetable paſture, and by diſſolving the vegetable food, and fitting it for entering the roots of plants. It is probable, that the two laſt are the ways by which it chiefly operates.

By this it exhauſts the land of its vegetable food. For it cannot be ſuppoſed to attract from the air a ſufficient quantity of food for the nouriſhment of the crops which it enables the land on which it is laid to carry; and it contains none of this food in itſelf. This is confirmed by experience. If land upon which lime has been laid, is exhauſted by crops, the application of lime a ſecond time has not the ſame effect as before; unleſs the vegetable food is ſupplied by dung, or the land allowed to reſt for ſome years, and have the vegetable food ſupplied by the air.

Thus it appears, that lime from its nature muſt act both as a ſtimulus and a manure; while it makes the earth exert itſelf in the nouriſhment of vegetables, in ſome meaſure alſo enriches it, and adds to the vegetable food.

In ſome lands, the diſſolving the vegetable food, and fitting it for entering the roots of plants, may be moſt beneficial: in others, the communicating the power of attracting the vegetable food from the air, may be moſt beneficial. It will not be improper, therefore, to point out how lime is to be applied, ſo that it may chiefly anſwer the one or the other of theſe purpoſes.

In uncultivated land, in which there is a large quantity of vegetable ſubſtance, lime ought to be uſed chiefly as a ſtimulus: and when improved land needs a recruit of vegetable food, it ought chiefly to be uſed as a manure.

When lime is intended for a ſtimulus, a large quantity ſhould be applied at once. For it takes a conſiderable quantity to diſſolve roots, and the other vegetable ſubſtances in the land, and to produce a high degree of fermentation.

When lime is intended for a manure, a ſmall quantity applied at a time is ſufficient. It is probable, that it requires only a ſmall quantity of lime to impregnate a large quantity of earth, and to communicate it to an abſorbent quality, in as high a degree as it is capable of receiving: and it is certain, that it is in proportion to the abſorbent quality which it communicates, that the ſoil is enriched by it. This is not a mere conjecture. It is certain that a ſmall quantity of lime will impregnate a large quantity of water, and communicate to it all its virtues, and theſe in as high a degree too as it is capable of receiving: it is not improbable, that it may operate in the ſame manner upon earth. If a ſmall quantity of lime communicates an abſorbent quality to a large quantity of earth, but has not ſuch influence in diſſolving vegetable ſubſtances, or in producing fermentation, it follows, that the ſmaller the quantity is which is applied, it will operate the more as a manure; and the greater the quantity applied it will operate the more as a ſtimulus.

It is proper to obſerve likewiſe, that when lime is applied in ſmall quantities as a manure, it is neceſſary to repeat the application frequently; for it is probable, that the ſoil by action loſes the abſorbent quality, which the lime communicates.

Theſe things which we have obſerved concerning the operation of lime in ſmaller and larger quantities, are, in ſome meaſure, confirmed by experience. They are agreeable to the practice in thoſe parts where lime is moſt uſed. When barren land is to be improved, it is laid on in large quantities; and when it is applied to land already improved, it is laid on in ſmall quantities, and frequently once in three or four years.

As lime operates by attracting acids from the air, the longer that it is expoſed to the air before it is ploughed in, it will exert itſelf the more quickly, and with the greater violence. Some alledge, that this ſhould not be done in ſummer. For they ſay, that the ſun acts contrary to the air; as the air ſupplies the ſalt, the ſun exhales it, and communicates it again to the air.

As lime, when laid on in large quantities, exhauſts land of its vegetable food, it is neceſſary to ſupply this food by dung, or ſuch other manures as have it in great plenty; or the land ſhould be managed in ſuch a manner, as to prevent, as much as poſſible, the vegetable food from being exhauſted. Laying off land, after a very few crops of corn, into graſs for paſture, is the moſt proper way of doing this. Land, when paſtured, has not its vegetable food ſo much exhauſted, as when it carries corn. The quantity of vegetable food carried off in fleſh, by the cattle, or conveyed to the air by their perſpiration, bears but a ſmall proportion to the quantity carried off by a crop of corn and ſtraw.

It is neceſſary further to obſerve, that as lime communicates its virtues to water, land inclining to be wet, and from which the water has free acceſs away, is not proper for it: for the water, in running off, carries along with it the virtues of the lime.

There are a variety of marles, which are commonly reduced to three ſorts: the clay, the ſtone, and the ſhell.

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The firſt has its name from its ſimilitude, in appearance, to clay; the ſecond from its hardneſs, and ſimilitude to ſtone; and the third from the ſhells, with which it is mixed, or rather of which it is compounded.

The clay and ſtone marles are of the ſame nature; the ſhell marle is very different from both. This makes it neceſſary to treat of them ſeparately.

Marle of the ſtone and clay kinds promotes vegetation in a ſurpriſing manner. It is probable, however, that it contains in itſelf few of the principles of which the vegetable food is compounded. Plants are not able to find their food in it. When in a bed below the ſurface, it reſiſts the entrance of water, like till or clay. When near the ſurface, and turned up by the plough in great quantities, the ſoil is little better than till, almoſt quite barren. The method of its operation will be beſt known by inquiring into its qualities.

It is obſerved, that both the clay and ſtone marles have the following qualities.

When long expoſed to the air, or put into water, they fall down into a powder: they are very heavy bodies: the earth of which they are compounded, is of the abſorbent kind: they are attractors of acids; with them they raiſe a fermentation, and produce ſalts.

The only difference betwixt them is this: the clay marle is ſooner diſſolved than the ſtone marle; and commonly has a ſtronger power of deſtroying acids, and producing ſalts. Dr. Home ſays, that the clay marle, which he tried, deſtroyed a third more of acids than the ſtone marle.

Theſe marles ſeem to have much the ſame qualities with lime; and, therefore, muſt operate in the ſame manner.

They communicate to the ſoil a power of attracting the vegetable food from the air, they enlarge the vegetable paſture; and they diſſolve the vegetable food that is in the ſoil, and prepare it for entering the roots of plants.

Theſe marles communicate to the ſoil a power of attracting the vegetable food from the air. The abſorbent earth which they contain, and the ſalts which they produce, are ſtrong attractors of oils.

It is obſerved, that they attract oils ſo ſtrongly, that they are uſed by ſome to extract greaſy ſpots from cloaths. When laid upon land, they will therefore attract oil from the air, which is the ingredient of the vegetable food moſt wanted.

Theſe marles enlarge the paſture of plants. They ferment with acids, and fall down into powder, when expoſed to the air, or put into water. Theſe things make them operate in ſeparating the particles of the ſoil, with which they are mixed.

Theſe marles alſo prepare the vegetable food for being nouriſhment to plants. The ſalts which they produce, not only attract oils from the air, but alſo from the ſoil; diſſolve theſe oils, and render them capable of bein gmixed with water; and of being conveyed by it into the roots of plants.

According to ſome, theſe marles contain ſome oily matter. This, if true, would make them operate in a manner different from lime. But this is uncertain. The earth of which theſe marles are compounded, is of the abſorbent kind; it cannot be long expoſed to the air, without attracting oils; and therefore, though they contain none in their original compoſition, yet ſome marks of them may appear upon trial.

Theſe marles are long in diſſolving. Large pieces of the ſtone marle are ſeen ſometimes undiſſolved, ſix or ſeven years after it has been laid upon land. This makes it neceſſary to apply a very large quantity of them, otherwiſe their effects will not be known.

As the quantity of marles applied is very great in proportion to the quantity of lime, land, when manured with marle, muſt have a ſtronger power of attracting the vegetable food from the air; and therefore the marle ſhould be preferred, when it can be as eaſily obtained.

As the earth of theſe marles is of the abſorbent kind, as a great quantity of it is applied at one time, and as it is long in diſſolving, it muſt be many years before its operation ceaſes; and, if the land is barren, the nature of it will be changed, and ever after, by the ſame kind of dreſſings it received before, will continue to carry better crops. In this reſpect alſo it is preferable to lime. This advantage, however, depends, in a great meaſure, upon the nature of the ſoil. If the ſoil is ſoft and ſpungy, and has not a firm bottom, the marle, by its weight, will, by degrees, penetrate, like lime, beyond the reach of the plough; and therefore, muſt leave the ſoil no better than it found it.

Although, in ſome reſpects, theſe marles ſeem preferable to lime, yet we are to conſider, that their principal operation is the ſame with that of lime; which is enlarging the paſture of plants, and fitting the vegetable food for entering their roots. When land, therefore, manured with them, is exhauſted by crops, it cannot receive much benefit from them a ſecond time, if immediately applied. This is confirmed, it is ſaid, by experience. It is obſerved, that marle, when applied a ſecond time to land exhauſted by crops, has not the ſame effect as when firſt applied.

As marle operates in the ſame manner as lime, it follows likewiſe, that limed land exhauſted by crops, can receive little benefit from the application of marle; and that marled land, exhauſted by crops can receive little benefit from the application of lime. As it exhauſts the vegetable food, the proper manure after it is dung, which contains this food in the greateſt plenty.

It was obſerved, that marle operates chiefly by attracting oils and acids from the air; the longer, therefore, that it lies upon land, expoſed to the influence of the air, the more quickly it will operate.

The difference betwixt the clay and ſtone marles was ſaid to conſiſt in this: that the clay marle diſſolves ſooner, and has a ſtronger power to deſtroy acids and produce ſalts. This kind is therefore preferable, as a leſs quantity will produce the ſame effects. If Dr. Home's experiments are to be depended upon, or rather, if all clay and ſtone marles have the ſame powers with thoſe which he made his experiments with, then four cart-load of the clay marle is equal to five of the ſtone.

What was ſaid of lime, with reſpect to the application of it in ſmaller and larger quantities, may likewiſe be ſaid of marle. When barren land is to be improved, the marle ſhould be laid on in large quantities: but when land is in good order, the applying a fifth or ſixth part of the quantity commonly uſed, once in ſix or ſeven years, may have very good effects.

Shell marle is very different in its nature from the other two. It is commonly claſſed among the animal manures.

It does not diſſolve with water, as the other marles do. It ſucks it up, and ſwells with it, like a ſponge. It is a much ſtronger attractor of acids than they. Dr. Home ſays, that it takes ſix times more of acids to ſaturate it than

any of the other marles which he had met with. But the greateſt difference betwixt the ſhell marle and the other marles conſiſts in this. The ſhell marle contains oils. It is uncertain whether the other marles contain any oils; but this kind, it is ſaid, contains them in great plenty.

This marle, it would ſeem, from the qualities which it poſſeſſes, promotes vegetation in all the different ways. It increaſes the food of plants; it communicates to the ſoil a power of attracting this food from the air; it enlarges the paſture of plants; and it prepares the vegetable food for entering their roots.

It increaſes the food of plants by the oils which it contains, and the ſalts which it produces: by theſe ſalts, and by the abſorbent quality which it poſſeſſes, it communicates to the ſoil a power of attracting this food from the air. It enlarges the paſture of plants, by its ſwelling with water, and the fermentation which it occaſions; and it prepares the vegetable food for entering the roots of plants, by the ſalts it produces in fermentation.

It will not be improper to attend the effects of theſe different operations. The communicating vegetable food immediately to the ſoil, and communicating to it a power of attracting this food from the air, have the ſame effects. By both theſe operations the vegetable food is increaſed.

The enlarging the paſture of plants, and fitting the vegetable food for entering their roots, have alſo the ſame effects. By both the vegetable food is diminiſhed. It is obvious, that, by theſe operations, plants are aſſiſted in extracting this food from the ſoil.

The oils which it contains, it is probable, are ſoon exhauſted: having a ſtrong power of attracting acids, and forming ſalts, it is natural to ſuppoſe that theſe ſalts do more than work upon its own oils: they will alſo attract and diſſolve the oils which they meet with in the ſoil; and would exhauſt it of the vegetable food which it contains, was it not for the ſtrong abſorbent quality which it communicates. This quality, it is probable, remains after the operation of the ſalts is over; and thus, upon the whole, the ſoil is rather bettered by it.

We had occaſion to ſhow, that the difference betwixt poor and rich ſoil conſiſteth in the different powers of attraction. As this marle has ſo ſtrong an abſorbent quality, if it is applied in large quantities, and frequently repeated, it is poſſible that it may communicate ſuch an attractive power to the ſoil, as to enrich it in a very high degree, ſo as to need no further manuring, but by proper tillage may be made to attract from the air in the winter ſeaſon ſuch a quantity of vegetable food as is ſufficient to nouriſh a crop in ſummer.

As this kind of marle does not exhauſt land of its vegetable food, as the other marles, or as lime do, it may be applied to land exhauſted by them, or it may be repeated. As it diſſolves ſooner than the other marles, its effects will be more ſudden, and as it does not diſſolve ſo ſoon as dung, its effects will not be ſo ſoon over.

A late author ſuppoſes, that the marle found below moſs is compounded of earth and the alkaline ſalts of rotten wood. He explains in what manner he imagines it is formed. If there is a marle compounded of theſe ingredients, it is different from any of the marles that have been mentioned. However, it will operate much in the ſame manner. It will communicate a power to the ſoil of attracting the vegetable food from the air; it will enlarge the paſture of plants, and it will prepare the vegetable food for entering their roots.

As it contains a large proportion of ſalt, its effects will be ſudden and violent. It is not proper therefore that a great quantity of it ſhould be applied.

As its effects are ſudden and violent, it cannot be expected that they will laſt long. It is probable that they will be ſoon over after it is entirely diſſolved.

The ſalts which it contains, will make it operate chiefly in diſſolving the vegetable food in the ſoil, and fitting it for entering the roots of plants. By this it will exhauſt the ſoil, if care is not taken to prevent it, by the application of dung, or turning the land from tillage into graſs for paſture.

There is another kind of marle that goes under the name of ſhell marle, and in ſome parts of the country is found in great plenty. It ſeems to be almoſt wholly lime, and it operates in the ſame manner.

Aſhes contain a large proportion of ſalt; they attract acids more violently than any other thing as yet known, but they ſoon loſe their virtue.

The effects of aſhes will then be of the ſame kind with lime. But as aſhes contain ſalt, their operation will be more ſudden; as they attract acids with greater violence, and ſooner loſe their virtue, their operation will be more violent, and ſooner over. This is confirmed by experience. The firſt crop after land is manured with aſhes is commonly very luxuriant, and the ſecond crop exhauſts almoſt the whole of their virtues.

As the effects of aſhes are ſudden and violent, they ſhould be applied in very ſmall quantities; and as they operate in the ſame way with lime, they ſhould not be applied to land exhauſted by lime or marle; ſhould not be followed by theſe, nor repeated.

Turf is compoſed chiefly of vegetables; that which remains then after burning, muſt be of the ſame nature with aſhes. To theſe the fertility communicated to the ſoil is chiefly owing. It is found from experience, that in proportion to the number of roots contained in the turf the burning turns out to advantage; and therefore land, with a tough ſward of graſs upon it, is recommended as the kind moſt proper for being improvod in this manner.

The heat which part of the ſoil receives from burning the heaps of turf is ſuppoſed to contribute to its fertility: but this can have little influence except to deſtroy any ſeeds or roots of weeds that may be in the land.

In burning the turf, care muſt be taken to cover the heaps in ſuch a manner as to prevent the fire from breaking out into flame. Where this happens, it is obſerved, that the aſhes loſe part of their virtue, and that the parts of the field manured by them are not ſo much enriched as the other parts are by the heaps of turf that are burned without flame. It is natural to think, that the earth of the turf, when properly piled up, will retain the oils of the vegetables, and prevent them from aſcending into the air in ſmoke and flame.

This makes ſome difference betwixt the manuring by burning and the manuring by aſhes. However, as the oils contained in burned turf are in very ſmall quantities, we may well ſuppoſe that they will ſoon be exhauſted by the ſalts; and therefore, though the effects of burning may be more violent, yet will be equally ſudden, and as ſoon over.

To prevent burnt land from being exhauſted, one crop only, or two at moſt, ſhould be taken, and then turned into graſs for paſture. If a little dung is added after the firſt crop, its fertility will be the longer preſerved.

Soot cannot be procured in ſuch large quantities as to be uſed by itſelf, excepting in the neighbourhood of large cities; it is needleſs therefore to inſiſt upon it.

It contains oil, ſalt, and earth. Theſe, it ſeems, are compounded in ſuch a manner as to be ready to be conveyed into the roots of plants by water. For the effects of ſoot, when ſpread upon the ſurface, are diſcovered immediately after the firſt rain. It promotes vegetation in the ſame manner as dung, or ſhell marle. It encreaſes the food of plants by the ingredients of the vegetable food which it contains. It enlarges the paſture of plants, enables the ſoil to attract the vegetable food from the air, and prepares it for entering the roots of plants by the ſalt that it contains, which is of the alkaline kind, attracts and ferments with acids, and attracts and diſſolves oils.

As it contains great plenty of vegetable food, and as its effects are ſudden, it muſt be laid on in very ſmall quantities. Sowing it in the ſpring on winter corn or graſs, ſeems to be the moſt proper way of uſing it.

When the quantity laid on is but ſmall, and its effects ſudden, it cannot be ſuppoſed to laſt long. Its virtues are commonly exhauſted by one crop.

When its effects are over, the ſoil is left in the ſame ſituation as before it was laid on, not exhauſted of its vegetable food, as by lime or aſhes; and therefore it may be repeated; or it may be followed by theſe manures, as it is very proper to be applied to land that is exhauſted by them.

All the plants that grow upon the rocks within reach of the ſea, are good manures. Thoſe that grow upon the rocks that are almoſt always covered by the water, are the richeſt.

Some kinds of ſea-weed are burnt for kelp. This, it is thought, turns out to greater advantage than uſing them as manures. The beſt kinds for manures cannot be reached, as their roots are almoſt always below water; but they are frequently driven on ſhore by the ſea. A conſiderable quantity of them may always be expected on the ſhore in the neighbourhood of the rocks, where they grow, when a ſpring tide, heavy rain, and a high ſwelling ſea all happen at the ſame time. The ſpring tide expoſes their roots to the air, the freſh water falling in rain looſes the roots, and the high ſwelling ſea tears them up. Sometimes the tide carries them to a conſiderable diſtance.

They are of a ſoft pulpy nature, eaſily diſſolve, and ſoon putrefy; and they contain oil, ſalt, and earth. They muſt promote vegetation therefore in the ſame manner as dung or ſoot.

Their effects are ſooner over than thoſe of dung mixed with vegetables from a dunghill; for they ſooner diſſolve and ſooner putrefy.

They may be applied to ſoil in any ſituation, and are very proper for land exhauſted by lime or aſhes.

When their effects are over, the land is in no worſe a ſituation than before they were applied, and any kind of manure may be applied after them.

The oftener they are applied, the land becomes the richer; for the earth of which they are compounded, is of the abſorbent kind. This is confirmed by experience. The land near the ſhores, where theſe ſea-weeds are in greateſt plenty, and have been long uſed as manures, are amongſt the richeſt in Scotland, and have been kept almoſt conſtantly in tillage.

They are preferable to dung in this reſpect, that they do not produce ſuch a quantity of weeds. Every perſon that has uſed theſe manures, knows, that weeds do not appear in ſuch plenty upon land manured with ſea-weed, as upon land manured with dung. This ſeems to confirm the opinion of thoſe, who aſſert, that the great quantity of weeds mixed with the dunged land, are produced by ſeeds mixed with the dung. But it is ſubmitted, whether this difference is not owing to the great quantity of ſalts contained in the ſea weed and applied with it, which at firſt deſtroys ſome of the ſeeds and roots of weeds. Salt, applied in too large a quantity, is undoubtedly a poiſon to many plants. According to Mr. Tull's experiments, a ſmall quantity of ſalt water deſtroyed a plant of mint. It is obſerved likewiſe, when any graſs upon the ſhore is overflowed by a ſpring tide, it withers away in a few days, and does not recover till it gets a plentiful ſhower. Then indeed, by the freſhneſs of its verdure, it is diſtinguiſhed from the graſs that was not overflowed by the ſalt water. That it is the ſalt in the water that deſtroys the plants, is obvious: for the quantity of freſh water would have had no ſuch effect. And it is probable, that the oils attracted by the ſalts, and carried down by the rain, are the cauſe of their recovery.

In many places, particularly near the ſea-ſhore, broken ſhells are found in beds. Theſe are uſed by ſome as a manure.

They ferment with acids, and, like other animal ſubſtances, contain oil, ſalt, and earth. The oil and ſalt are not in great quantities in proportion to the earth, and they take a long time in diſſolving.

Their operation muſt be of the ſame kind with that of ſhell marle, but ſlower and weaker.

They make ſome addition to the vegetable food by the ingredients of this food of which they are compounded. They communicate to the ſoil a power of attracting this food from the air; and they diſſolve it by the ſalts which they contain and produce. And they increaſe the paſture of plants by the fermentation.

They operate chiefly by enlarging the paſture of plants and preparing the vegetable food for entering their roots. They are ſo long in diſſolving, that the quantity of oil communicated in a ſeaſon muſt be ſmall in proportion to the ſalts which they produce. Though theſe are their principal operations, yet in them they are inferior to lime, marles, or aſhes.

As they take a long time to diſſolve, and do not operate quickly, it is neceſſary to apply them in large quantities. For without this their operations will ſcarcely be perceptible.

For the ſame reaſon it may be expected they will continue for a conſiderable time. They will continue till the ſhells are wholly diſſolved, and all their oils exhauſted in vegetation.

As they operate chiefly by enlarging the paſture of plants, and fitting the vegetable food for entering their roots; they will in ſome degree exhauſt the land of its vegetable food, though not ſo much as lime or aſhes do, as they communicate ſome oils to it in diſſolving. It is not proper therefore to apply them after lime or aſhes, to repeat them immediately, or apply lime and aſhes after them.

If they are taken up from below the ſurface, as muſt happen moſt commonly, it is proper to allow them to lie ſome time expoſed to the air before they are ploughed down. This will not only aſſiſt their fermentation, but will alſo promote their putrefaction.

As lime, when mixed with them, takes a very ſtrong hand, it is probable, that the mixing them together in the application may in ſome caſes produce very good effects.

It is a practice in ſome places to ſow turnip, buck-wheat, peaſe, &c. on land; and when grown up, to plough them down for manures.

Theſe may be called vegetables in an entire ſtate, to diſtinguiſh them from dung made of putrefied vegetables; though no vegetable can be a manure till it is putrefied.

As theſe vegetables receive their food from the ſoil on which they grow, it is natural to think, that when ploughed down, they do no more than reſtore what they have taken; and therefore, that by this operation land cannot be rendered more fertile than before; at leaſt, cannot communicate ſuch a quantity of vegetable food to it as may be done by frequent ploughings. For the vegebles, though ploughed down, are not all preſerved; a part of them being uncovered, is blown away by the winds. Beſides, the plants while growing, cover the ſurface, and prevent the vegetable food in the air from entering the ſoil; whereas, when land is frequently ploughed, none of its vegetable food is exhauſted, and it is expoſed to receive all the benefits from the influence of the air. But, notwithſtanding this, ſome aſſert from experience, that a crop of ſuch vegetables as thoſe mentioned, ploughed down, render land more fertile than frequent ploughings without the application of manure.

To account for this upon the principles eſtabliſhed, let the following things be conſidered.

The ſoil, manured by ploughing down a crop of vegetables, receives all the vegetable food contained in the ſeed ſown. This quantity in peaſe and buck-wheat is not very inconſiderable. The quantity in one grain is probably as much as there is in a whole ſtalk after the ſeed is fully ripened. It is obſerved, that plants, when cut green, exhauſt land of its vegetable food, but in a very ſmall degree to what they do when allowed to carry ſeed.

Some of the plants mentioned puſh down their roots below the reach of the plough, and bring up the vegetable food lodged there to the ſurface. Peaſe, turnip, clover, and other plants puſh down their roots very far; and whatever vegetable food they find, is ſucked up; and when they are ploughed down, this vegetable food is lodged near the ſurface, and thereby the quantity within the paſture of ſome other plants, ſuch as wheat and barley, is increaſed. A late author makes a calculation of the quantity of vegetable food which clover in this manner communicates to land, and repreſents it as very conſiderable. In few places the ſoil is ſo deep as to have the vegetable food in great plenty beyond the reach of the plough; and therefore it is probable, that this author, in his calculation, makes the quantity of this food brought near the ſurface by clover much greater than it really is. However, it is certain, that as plants puſh down their roots below the reach of the plough, they there find nouriſhment, which is communicated to their ſtems and leaves; and therefore, when theſe are ploughed down, the quantity of vegetable food near the ſurface is increaſed.

The covering of the ſurface ſeems to be an advantage; for thereby the air in the ſoil, not having a free communication with the external air, becomes putrefied, by which a fermentation is raiſed, and the vegetable paſture enlarged. Whatever is the cauſe of this fermentation, the fact itſelf is obvious. Every farmer knows, that when the ſoil has been covered for a conſiderable time by a ſtrong crop of peaſe, or any other kind of corn laid down, and what is commonly called flooming, though naturally hard and ſtiff, becomes mellow, ſoft, and free, and obviouſly in a ſtate of fermentation. It is probable, that this is occaſioned by the corruption of the air, or of the water, which the covering of the ſurface prevents from being exhaled.

To theſe things it may be added, that it is not impoſſible but the plants when growing may ſuck in the vegetable food from the air in as great plenty as the ſoil would have done, though there had been no plants growing upon it. If plants have this faculty, conſidering what an immenſe ſurface is expoſed by them to the influence of the air, the quantity of vegetable food acquired cannot be inconſiderable.

Having thus conſidered the effects of ploughing, harrowing, rolling, and manuring land, in order to produce a large crop of wheat, we ſhall now proceed to the cultivation of this uſeful ſpecies of grain.

It has been very juſtly obſerved by the ancients, as well as moderns, that wheat will grow in almoſt any part of the world, and that, as it is the plant moſt neceſſary to mankind, ſo it is the moſt general, and the moſt fruitful. It thrives not only in temperate climates, but alſo in very hot, and very cold regions; and, when ſown in places where it never grew ſpontaneouſly, ſucceeds as well as where it has been always common. The ſucceſs of our crops of wheat in America plainly proves this: and in Peru and Chili in particular, where this grain was not known till the Europeans introduced it there, it now produces as large crops as in moſt parts of Europe.

Wheat ſhould be ſowed in autumn, and always when the ground is moiſt. In the downs of Hampſhire, Wiltſhire, and Dorſetſhire, farmers begin to ſow their wheat in Auguſt, if any rain has fallen, and even employ their people to ſow one place, whilſt they reap another, if wet weather interrupts them in their harveſt: for if the corn is not forward in autumn, ſo as to cover the ground before winter, it ſeldom does well on thoſe high dry lands, eſpecially if the enſuing ſpring proves likewiſe dry. In low ſtrong lands, ſome huſbandmen think they are in good ſeaſon, if they get their wheat into the ground by the middle of November; nay, it ſometimes is Chriſtmas, or even later, before all their wheat is ſown. But this late ſown wheat, beſides being apt to run too much to ſtraw, eſpecially if the ſpring be moiſt, is liable to be thrown out of the ground by froſts.

In general, all wheat ſucceeds beſt upon ſtrong ſoils, eſpecially if they have been well drained, ſo that the corn lies dry: but as ſome ſorts of this grain thrive better in ſome ſoils than in others, it might redound to the public welfare if more particular obſervations were judiciouſly made, in regard to each kind, than have hitherto been. The white egg-ſhell wheat is reckoned beſt for light lands, and to ſow with rye for meſlin; becauſe it ripens ſooneſt. It ſhould alſo be the earlieſt in the ground. This ſpecies is much ſown in Eſſex, upon their hazely brick-earths, or loams; as the red wheat, and the Poland bearded wheat alſo is there, and in Hertfordſhire upon ſtiff yellow clays. The white Poland, or pole-rivet wheat has not a hollow ſtraw, and therefore is not ſo ſubject to lodge as other corn that has. This kind is particularly fit for lands where the crop is apt to run much to ſtraw.

In Oxfordſhire, they have a ſort of wheat which they call long coned-wheat, and reckon the beſt for rank clays. Its ſtraw not being hollow, it is the leſs liable to lodge, and farmers obſerve that it is the leaſt apt to be mildewed, or be eaten by birds, from which laſt it is greatly guarded by its long rough awns; but the flour of it is ſomewhat coarſe. Their white kind of red eared wheat has a white ear and a red grain, and is a very good ſort for clayey land. It yields a good crop, and ſeldom ſmuts.

In Staffordſhire, they reckon the red Lammas or bearded wheat the beſt for cold lands or ſtiff clays.

In Berkſhire is a wheat called pendulum-wheat, from the hanging of its ear, much like the cone-wheat.

In Northamptonſhire, they have a ſort of wheat with a white ſtraw and reddiſh ear and grain; much commended for the plumpneſs and largeneſs of the grain, and the ſtrength of the ſtraw, which prevents its being ſubject to lodge; nor is it apt to be eaten by birds. They have alſo a red eared bearded wheat, and a ſort of pollard or duck-bill wheat, as it is called, known in Suſſex by the name of fuller's wheat, which has ſo cloſe and thick a huſk, that the birds never injure it. Mr. Miller obſerves that this ſort of wheat grows very tall, and, if it be ſown too thick, is very apt to be lodged by rain and wind; for that its ears are large and heavy, and incline on one ſide as the grain increaſes in weight: but that, if its roots are at a proper diſtance from each other, it will tiller greatly and have ſtrong ſtalks, and that the grain of this wheat yields more flour in proportion than that of any other ſort. The awns of this wheat always drop off when the grain is full grown.

Smyrna wheat, commonly called many-eared wheat, becauſe ſeveral leſſer or collateral ears grow around the bottom of the main ear, which is very large in its ſtate of perfection, requires more nouriſhment than the common huſbandry in the large way can give it, and therefore is not cultivated by our farmers: but it would, probably, do extremely well in the horſe-hoeing huſbandry, where the quantity of food can be enlarged almoſt at pleaſure. For the ſame reaſon maiz, commonly called Turky or Indian corn, is fitteſt for this laſt huſbandry. *See* MAIZ.

Some gentlemen have been curious enough to procure their ſeed wheat from Sicily, and it has ſucceeded very well as to the growth: but the grain of this ſpecies has proved too hard for our Engliſh mills to grind.

The beſt time for ſowing wheat is about the beginning of September, eſpecially if any rain has fallen; a circumſtance ſo eſſential, that, if the earth be very dry, the farmer had better ſtay till friendly ſhowers have moiſtened his ſoil, than put his corn in ground where it will not grow before it has been wet, let the time be ever ſo long. Mr. Mortimer ſays he has known wheat to be ſo muſtied and ſpoiled by laying long in the ground, before rain came, that it has never grown at all: to which he adds, that he has likewiſe ſeen very good crops of wheat from ſeeds ſown in July. It is a general practice among farmers, to make choice of a time for ſowing their wheat when the earth is moiſt: and the writers on agriculture have likewiſe, in general, recommended that practice; but without aſſigning any reaſon for it, or ſuch reaſons as are by no means ſatisfactory. This is the more extraordinary, becauſe ſowing dry, is almoſt univerſally recommended and practiſed, in ſowing other ſeeds. The ground of this difference appears to be, that wheat being ſubject to be ſmutty, the ſeed is commonly brined and limed, which has been found in a great meaſure a ſecurity from that diſtemper in the crop. It is nevertheleſs true, that ſound good ſeed, from a good change, produces, for the moſt part, ſound crops of wheat, free from ſmuttineſs; and when ſuch ſeed is ſown dry, or without ſteeping, it is moſt adviſeable to ſow it when the land is dry. When the ſeed is ſteeped, it imbibes moiſture, more or leſs, in proportion to the condition of the ſeed, and the time it lies in the ſteep, and a vegetation commences: if the ſeed in this ſtate is laid in dry earth, and the weather for ſome time continues dry, the vegetation is checked, which kills or much damages the ſeed. Another inconveniency alſo ariſes from delaying to ſow, and waiting for rain; the ſeaſon for ſowing is delayed; and if much rain falls, the earth conſolidates, which renders it leſs proper for receiving and nouriſhing the ſeed, it being a general maxim with gardeners, and with huſbandmen, in other caſes, that ſeed thrives beſt upon freſh tilled ground. At all events, the huſbandman ſhould certainly have his wheat ſowing finiſhed by the middle of October. Whoever neglects this, ſhews, in ſo doing, a want of proper œconomy in his affairs, and will have cauſe to repent the delay.

Early ſowings require leſs ſeed than late ones, becauſe the plants then riſe better, and acquire ſtrength to reſiſt the winter's cold. More ſeed ſhould always be allowed for poor lands than for rich, becauſe a greater number of plants will periſh on the former. Rich lands, ſowed early, require the leaſt ſeed of any.

Another circumſtance which the huſbandman ſhould carefully attend to in ſowing, is that his eſtimate of ſeed be formed, not from the capacity of any particular meaſure, but from the number of grains which that meaſure will contain; becauſe the grains of ſome growths of wheat are much larger than thoſe from off other lands, though of the ſame ſpecies, and perhaps equally good. By not conſidering this, the ground will of courſe frequently be ſown too thick, or too thin: though I believe farmers are ſeldom apt to run into this laſt extreme. That they too often commit the former error, ſo manifeſtly contrary to their intereſt in every reſpect, is demonſtrated by reaſon, and by daily experience: but neither of theſe is ſufficient to make them deviate from the beaten track. Inſtead of the uſual allowance of three buſhels of ſeed wheat to an acre of land, repeated trials have ſhewn that half that quantity is generally more than ſufficient: conſequently a great deal of corn is actually thrown away; for the expence of purchaſing ſeed, which moſt ſkilful huſbandmen do, at leaſt every other year, amounts to a conſiderable article in large farms, and in a whole country, merits the attention of the public, eſpecially in ſcarce years: beſides which, the future plants, crowded together by being thus ſown too thick, and not having a ſufficient ſpace allowed them for their ſuſtenance, cannot yield near ſo fine and plentiful a crop as they would otherwiſe produce. A fair trial, made with proper care, would ſoon convince farmers of their error in this reſpect; for if they but examine a field of corn ſown in the common way, they will find few plants with more than two or three ſtalks, unleſs by chance, where ſome of them ſtand ſo as to have room to ſpread. Theſe will have ſix, eight, or ten ſtalks, and frequently many more: but a field of wheat ſown with only a buſhel of good corn has been known to be well covered with healthy vigorous plants, each of which has had from ſix to fourteen, or more ſtalks, crowned with long well nouriſhed ears, full of fine plump grain, of which it has

yielded

yielded a much greater quantity than any of the neighbouring grounds ſown with the common allowance. If the land is good, and the plants ſtand at a proper diſtance from each other, few of them will produce leſs than the above number of ſtalks and ears. But farmers think they ſhall have no crop if the ground is not covered with the blades of corn by the ſpring: whereas, if they would have patience to wait till the plants put out all their ſtems, they would be amply convinced of the contrary. Every one muſt have obſerved in places where foot-paths are made through corn fields, that, by the ſide of thoſe paths, where the corn is thin, and has been trodden down in the winter and ſpring, the plants have ſtood erect, when moſt of the corn in the ſame field has been laid flat upon the ground; an advantage which can proceed from no other cauſe, than that their ſtalks are ſtronger from their having more room: for thoſe of the other plants are drawn up tall and ſlender by being too cloſe together.

More ſeed is commonly ſowed upon new broke up ground, than upon that which has been longer in tillage. From half an inch to three inches is the uſual depth at which wheat is planted, according to the nature of the ſoil; the ſtiffeſt lands requiring the ſhalloweſt ſowing, as was before obſerved. The general cuſtom is, to ſow it under furrow, which is certainly moſt adviſeable if the ſoil be ſhallow, to prevent the plants being thrown out by the winter's froſts, or their roots being left bare by the drying winds in the ſpring. Some ſow in broad caſt, either with a ſingle caſt, or double bout, harrowing once between; after which the ground is again harrowed ſeveral times, till the ſeed is well covered. However, a great deal of it will become the prey of birds, in this manner of ſowing. On the other hand, in planting the corn deep, there is the greater danger of its being eaten off by worms between the grain and the blade.

Great care ſhould be taken to guard againſt the rooks juſt at the time when the wheat is ſhooting up. Theſe miſchievous birds perceive its ſprouting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt therefore be carefully kept off the ground for a week or ten days at this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble about ſtealing it. They never moleſt the wheat which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it eaſier to pick up that, than to ſearch for corn under ground in the new-ſown lands.

No part of huſbandry requires the farmer's attention more than keeping his land free from weeds; yet few trouble themſelves much about this eſſential article, are ſenſible of its importance, or underſtand the proper method of doing it: nay, many do not even know which weeds are annual, and which perennial; a diſtinction highly neceſſary to be made by every perſon who would keep his ground clean and in good order, and without which the greateſt induſtry will often be baffled. Annual weeds may be ſoon deſtroyed, if taken in time; but if they are neglected, their ſeeds will ripen, and ſow themſelves in ſuch abundance, that much additional labour and expence will be required to do that which might have been performed with eaſe at the beginning, without ſubjecting the corn to be robbed of its nouriſhment by bad neighbours. The common method of weeding is very abſurd: for in that practice the weeds are to grow till the wheat begins to ear and they are in flower; by which means the ground being covered by the corn, all the low weeds are hid, left to ripen, and ſcatter their ſeeds: only the tall weeds are taken out; and if the people employed are not careful, many of theſe will eſcape them, by being ſo intermixed with the ſtalks of the wheat, as not inſtantly to be diſtinguiſhed. At the ſame time great numbers of the plants of wheat are broken and trod under foot by the weeders.

To obviate theſe inconveniencies, Mr. Miller recommends the method now practiſed by good kitchen gardeners, who clear their ground with a ſmall kind of hoe, which, if uſed among the wheat early in the ſpring, before the ground is covered by the blades of corn, will effectually eradicate all the weeds, eſpecially if this work be done in dry weather; becauſe being ſmall, they then ſoon wither and die. If the ground happens to be very full of weeds, it may be neceſſary to go over it a ſecond time, about a fortnight after the firſt, to cut up thoſe which may have been too ſmall to be noticed. By this means the corn will be kept clean, freed from robbers, which would deprive it of due nouriſhment, and there will not be time for new weeds to grow ſo as afterwards to do it any great prejudice: for the ground will be ſo much ſhaded by the corn, that the weeds will thereby be kept down in ſuch manner as not to ripen their ſeeds before harveſt.

If, at the time of this operation, ſome of the plants of corn are cut up where they grow too cloſe, the reſt will be greatly benefited thereby: "but in this, adds Mr. Miller, I fear that few of the old farmers will ever agree with me, though what I mention is not from theory, but from experiments repeated with great care, and ſuch ſucceſs, that the produce of twenty rods of ground was much greater both in weight and meaſure, than that of the ſame extent in the very beſt part of the field, where this was not practiſed; and the ſtalks of the corn thus thinned ſtood upright, when a great part of the crop in the ſame field was lodged."

Both the advantage of having the plants of corn at proper diſtances from each other, and that of keeping them quite free from weeds, too difficult, not to ſay almoſt impracticable, taſks to be completely effected in the common method of ſowing, are fully obtained in the New Huſbandry, as will ſoon be evidently ſhewn.

M. Duhamel and Mr. Miller juſtly blame the practice of thoſe who either turn hogs in among their wheat, to deſtroy part of it when it grows too thick; or ſheep to eat it down, when they think it too rank. The abſurdity of the former is ſelf-evident: and in regard to the latter, it is well known, from long experience, that the leaves, or blades of corn, are neceſſary to draw in nouriſhment from the air and dews, for the increaſe of the ſtalk and ear. To be thoroughly ſatisfied in this, Mr. Miller cut off the leaves of ſome plants of wheat, alternately, early in the ſpring, and always found the ſtalks of theſe plants much ſmaller, the ears ſhorter, and the grain poorer, than thoſe of the intermediate plants whoſe blades were not cut. Several experiments made by M. Duhamel have proved, not only that all plants are impeded in their growth, and rendered leſs perfect in their productions, but often even killed, by ſtripping them of their leaves: and this is confirmed by Mr. Miller, who adds, that he has frequently obſerved in gardens, that plants diveſted only of their lower leaves, plucked off by ignorant perſons upon a ſuppoſition of their drawing the nouriſhment from the head, have been greatly weakened thereby. The ſame will undoubtedly hold good with

with reſpect to corn: beſides which, cattle, and particularly ſheep, will often bite ſo cloſe as to deſtroy the crown of the plant from whence its future growth ſhould proceed.

Wheat is ripe when its ſtraw is turned yellow, its ears hang, no greenneſs appears in the middle of them, and the grain is hard when bitten.

It was formerly a cuſtom among farmers, to delay reaping their wheat till it was very ripe, except in the neighbourhood of London, where their land was ſown early, warmed with good manure, well tilled and kept clean from weeds; in theſe circumſtances and their reaping before the wheat was very ripe, their harveſt was much earlier than in remote counties, particularly weſtward: for this reaſon, ſome induſtrious reapers, began wheat harveſt near London, and from thence they proceeded weſtward, reaping ſtill as they went on towards Wiltſhire, where they came in time for the harveſt, and all the way thither, by this means, they had a long harveſt, and earned much more money than thoſe who reaped in only one part of the country.

But many of the weſt country farmers do now reap their wheat, almoſt as early as about London; for they do not let it ſtand to be ſo ripe as they did formerly, and find their account in cutting it greener: for ſuch wheat has a better colour than the thorough ripe, and ſells for more money at market; and one ſkilful farmer, who cuts his wheat very early, and generally ſells it at a high price, aſſured me that he found upon trial, his wheat reaped early, was heavier by the buſhel, than the ſame wheat, when it ſtood till thorpugly ripe; the reaſon of which appears to be, that wheat cut before it is quite ripe, handles beſt, being ſmoother, and more ſlippery, than the very ripe, which contracts a roughneſs, that prevents its lying ſo cloſe in the buſhel, as the ſmoother early reaped wheat.

Hence it appears, that the greater weight of this grain, cut green, is not in conſequence of the grain filling and ripening in the ſtraw, after it is cut (for this farmer's wheat was commonly among the firſt at market) but becauſe, the wheat that is cut early is a ſmaller grained corn, and lies cloſer in the buſhel, which, in that reſpect, is no advantage to the farmer—and he is alſo liable to ſome loſs in threſhing, it requiring more labour to threſh it clean, than thorough ripe wheat, and more of it is uſually left in the ſtraw: but the advantages of reaping it early, more than balances theſe inconveniencies; as ſuch corn ſells at a better price, and there is a greater chance of good weather to harveſt it.

Good weather in harveſt is of great importance to the farmer, and to the public: and the delay of but a few days, is ſometimes attended with very bad conſequences. In the year 1757, much of the wheat being ripe, or ſo near ripe, that it might have been harveſted; but many farmers being willing to have it thoroughly ripe, and depending too much on a continuance of fair weather, delayed reaping a few days. In the mean time the weather altered from fair, to a ſmall driving rain, which continued ſo long with very little intermiſſion, that the ripeſt corn, though not lodged, ſprouted as it ſtood upon the ſtem to a very uncommon degree. The unripe corn eſcaped much better, and did not much of it ſprout, but continue to vegetate, fill and ripen, till the return of fair weather. The damage, however, was very great, and the price roſe in proportion: for much of the corn that had not ſprouted, ſo as to be viſible, had began to vegetate, and this being ground, together with the ſprouted and ſound corn, damaged the whole to ſuch a degree, that the bakers could not make good bread of them; and the bad effects were ſeverely felt that year and for a conſiderable time afterwards.

From four to five quarters an acre is reckoned a good crop: but ſome would hardly credit how much beyond this the produce of good ground, thoroughly well cultivated, may be increaſed. Thoſe who are ſenſible of the vaſt advantages of a perfect culture, will not be ſurpriſed at Mr. Miller's aſſuring us that he has known eight and ten quarters, and ſometimes more, reaped from an acre, over the whole field, where the corn has ſtood thin upon the ground; and that he has been informed by perſons of great credit, that even twelve quarters have been reaped from an acre of land drilled and managed with the horſe-hoe.

Both wheat and rye may be cut ſomewhat before they are thorougly ripe, eſpecially if they be lodged; for if the ſtraw be broken, it will no longer convey any nouriſhment to the grain. M. Duhamel ſeems to think this even the moſt eligible way for wheat, becauſe the grain will harden afterwards in the ſheaf; whereas, if it be let ſtand till it is too ripe, it will ſhed greatly in cutting, binding, and carrying home. It is partly to prevent this inconvenience, that good huſbandmen tie it in the evening, and carry it off early the next morning. The ancients reaped their corn before it was full ripe, as Pliny informs us. And indeed it muſt be allowed that very great diſadvantages neceſſarily attend the letting of ſome ſorts of corn ſtand till their grains have acquired their utmoſt maturity. Both the chaff and the fodder are the worſe for it; and, if ſuch ripe corn takes wet, the increaſe in malt is loſt, if it be barley, it having already ſpent itſelf; and if it be wheat, the quality of the flour is greatly impaired, as well as the quantity conſiderably leſſened. But if corn be cut greeniſh, it will bear a pretty deal of wet without damage; for it will not imbibe the water like full ripe corn, but only take in ſo much as to be kindly fed thereby. Again, if any ſort of corn be blighted, the ſooner it is cut down, though but half ripe, the better it will be; for nouriſhment can no longer be conveyed to it by the ſtraw; but it will be fed by lying in the ear. The ſtraw would become more and more brittle, by ſtanding till the corn is ripe; and the grain comes the clearer from the huſk, when threſhed, if this blighted ſort be cut early.

One man, with a binder, may reap an acre of wheat, and ſomewhat more of rye, in a day, if the corn ſtand well; he will alſo clear about an acre of peas, vetches, &c. in the ſame ſpace of time.

The medium price of wheat, in this country, is about five ſhillings the buſhel. If it be much under four ſhillings, the farmer cannot pay his rent and live; and if it exceeds ſix ſhillings, the poor ſort of people cannot afford to purchaſe wheaten bread. A buſhel of wheat weighs from fifty-ſix to ſixty pounds; a buſhel of barley, from forty-four to forty-ſeven pounds; and a buſhel of peas, from ſixty-three to ſixty-ſix pounds.

"The huſbandman, ſays Mr. Duhamel, cannot have a more favourable ſeaſon to get in his harveſt, than that which is afforded him by hot and dry weather; for the quality of the corn is improved, and the grain is rendered much fitter to keep, by the ſun's having acted powerfully upon it, either towards the latter part of its ſtanding, or

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juſt after it has been cut: though it is true, on the other hand, that this very circumſtance renders the ears more apt to ſhed their grain, and that the value of a ſowing is often loſt thereby. To prevent this, as much as poſſible, the corn is firſt laid in grips, and then tied up in ſheaves, in the cool of the evening, or early in the morning before the heat comes on; and the mowers of oats frequently work during part of the night, to avoid the exceſſively fatiguing ſultrineſs of the noon. Theſe poor people, whoſe taſk is infinitely laborious, are liable to many grievous diſorders; eſpecially the reapers, who, being obliged to ſtoop to their work, almoſt to the very point where the rays of the ſun are moſt violently reflected by the earth, breath a perfectly burning air. This forces them to drink copiouſly of liquors, which, being heated by the ſun, allay their thirſt only for a few moments, and I ſtrongly ſuſpect, often occaſion ſevere illneſſes: the inventing of a machine, engine, or inſtrument, by which the hardneſs of this labour might be mitigated, would therefore be a truly uſeful diſcovery, and I moſt heartily exhort all ingenious perſons who have a mechanical turn, ſeriouſly to think of it.

"The two uſual ways of cutting corn, are either with the ſcythe or with the ſickle. The former is commonly uſed for oats and barley, or, ſometimes, for very thin, ſhort wheat; and the ſickle is generally appropriated to the reaping of tall and thick wheat and rye. The ſcythe diſpatches ſo much more work than the ſickle, that the difference of expence between reaping an acre, and mowing it, is nearly in proportion of five to two.

"Every part of the mower's body labours and fatigues, and his work requires greater dexterity than that of the reaper: but as the mower is always in a kind of ſtanding poſture, he has the advantage of being refreſhed by every breeze of air; which the reaper, for the reaſons before mentioned, has not.

"I do not deſpair but that ſome engine may, one time or other, be found out, to eaſe theſe very hard labourers, and expedite their work. In the mean while, I am perſuaded that M. de Lille's following account of what he himſelf has practiſed on his own eſtate, will afford ſatisfaction to all my readers, who will be pleaſed to obſerve, that he does not relate matters of mere ſpeculation, but real facts; things actually executed by him, and which I ſhould certainly have tried, if I could poſſibly have been in the country when our harveſts were got in.

M. De Lille's Account of his Method of mowing Wheat.

"When I firſt put a ſcythe into the corn, I was of courſe laughed at by ſome of my neighbours, becauſe they had never ſeen any ſuch thing. I let them enjoy their jokes; but perſevered in my undertaking, which I have now practiſed ſufficiently to be able to point out minutely its advantages, and its inconveniencies; for I allow that, though the former are very great and numerous, it is alſo attended with ſome of the latter.

"The year 1751 was very rainy; our graſs rotted upon the ground, our corn was poor and infeſted with weeds, and the weather continued extremely bad during all the harveſt ſeaſon. One of my fields of wheat, containing about fifteen acres, was, in particular, in ſuch wretched plight, that I did not think the crop worth taking off. However, after walking over it, and viewing it on every ſide, I found that the quantity of graſs and other growths upon it, might, if mowed, afford a great deal of fodder, which would make me ſome amends for the total loſs of my lucerne. I therefore determined to let my horſes have it all, with the little wheat which appeared here and there. This firſt made me think of mowing a field of wheat; tho' I ſoon recollected that I had met with the hint before, in ſome writings. Accordingly I ſet my mowers to work: my field yielded a great quantity of fodder; the graſs, mowed within two inches of the ground, ſhot up anew, and afforded excellent paſture; and laſtly my bailiff, more ſaving than I had been, ordered the truſſes to be thraſhed, and got out of them as much wheat as was yielded by other grounds.

"Whilſt I was congratulating myſelf upon the ſucceſs of my operation, by which my horſes and cattle were provided with plenty of fodder for the next winter, I learnt that the huſbandmen in Hainault, Flanders, Artois, and other adjacent parts, never cut their corn down otherwiſe than with a ſcythe; but at the ſame time I was informed that they do not mow wheat in the ſame manner as oats: that the ſcythes are not made alike for both theſe works, and that there are ſome other eſſential differences.

"Theſe obſervations were a ſort of proof that the practice had been found to anſwer, ſince it was ſtill continued; and I concluded, that if my operation, imperfect as it was, had ſucceeded ſo well, I might expect far greater advantages when it ſhould be performed regularly: but, not to be too ſtrongly prejudiced in its favour, I reſolved to make a trial upon about thirty acres only.

"By dint of enquiry, I found within a few miles of me a huſbandman who came from the province of Artois, and had been uſed to this very buſineſs. I talked with him; he told me how the work ought to be done, pointed out its advantages, and I retained him for my intended next year's mowing of wheat: but as the ſeaſon was pretty far advanced, and there was not time to procure from his country other people equally well acquainted with the practice, to follow the ſcythe, and do the whole completely in every reſpect, he inſtructed two young lads, as well as he could. In ſhort nothing was wanting but a mere matter of form, by the neglecting of which ſome of the lifts of the cut corn were miſplaced, ſo that there were ears at both ends of the ſheaf.

"I ought not here to forget the clamour raiſed by this novelty. I made the experiment upon the fineſt wheat; becauſe my new workman had told me, that the ſtronger the corn was, the better and more regularly the mowing would be performed. My neighbouring huſbandmen, and all the reapers employed by them, thought me out of my ſenſes, and ſome of them even came to reaſon the matter with me. They meant well, and I took it kindly; but deſired them carefully to notice the event.

"My experiment was made upon three pieces of wheat, of ten acres each, ſituated in much more extenſive fields of the ſame corn; ſo that there was the faireſt room to make a juſt compariſon between the operation of the ſcythe and that of the ſickle.

"Some of the neighbouring huſbandmen had the curioſity to ſee the work performed, and were ſurpriſed to find that leſs corn was ſhed in this way, than in the common practice of reaping with the ſickle. They thought the method good; but made a few objections to ſome particular circumſtances, in which the experience of ſubſequent years ſhewed them that they were wrong. Their entire approbation then followed; and their mowers, finding that they ſhould be able by this means to cut down

down all their corn without the aſſiſtance of ſtrolling ſtrangers who often do their work very badly, gladly learnt the new method, and commended it to others.

"This work required a precaution which has been duly attended to ever ſince: it is, to pick all the ſtones from off the land every year, as carefully as poſſible. The expence of doing ſo is a very trifle, when compared to the advantages attending it. All the roads around my land, which were formerly impaſſable in winter, are now firm and good, fit for any carriage. We no longer hear of horſes lamed, or waggons overturned by them; and, which is equally true, I find that my ground now requires a leſs quantity of ſeed.

"I have now practiſed this method, in an extenſive manner, during five ſucceſſive years, in the courſe of which I have had opportunities of experiencing every circumſtance neceſſary to be conſidered in order to determine its real merit; I mean, mowing in rainy weather, and cutting of corn either bent, laid flat, totally lodged, or lodged only in particular places, and in various directions. I ſhall firſt deſcribe the mechaniſm of this mowing, and then point out its advantages, with the objections of my neighbours, which will ſhew the only inconveniencies I have met with.

"The Flemiſh mowers whom I employed in the year 1753, brought with them ſcythes exactly like ours. I ſaw no ſort of difference in their ſize, make, manner of being mounted, or even in the hooks they were trimmed with; ſo that I found I had been miſinformed by thoſe who told me in 1751, that this work required an inſtrument different from that which is uſed for mowing oats. It was not till the year 1755, that an ingenious workman pointed out ſome very proper alterations, which have ſince been made.

"This intelligent mower obſerved, that the common ſcythe cannot ſuit any ground but ſuch as has been plowed flat; that it therefore was leaſt of all proper for our lands, which are ploughed in ridges of ten or twelve furrows, raiſed very high in the middle; and that its hooks broke the ſtraw, plucked off numbers of ears, and did not lay hold of many ſhort plants which grow in the bottom of the furrows, whereby a loſs was occaſioned, or take up the intermixed graſs and weeds ſo exactly as might be wiſhed. To remedy this, he took a ſcythe at leaſt ſix inches ſhorter than thoſe which are commonly uſed, and, inſtead of the hooks, ſubſtituted what he calls the bender, conſiſting of two ſhoots of willow, or other green wood, placed ſemicircularly upon the handle of the ſcythe, where the hooks are commonly ſet. To this end there muſt be four holes in the handle, ſo that the end of one twig may be put into the lowermoſt hole, and its other end into the third, and the two ends of the other twig into the ſecond and fourth holes. The ſcythe thus trimmed is to be uſed in the manner I ſhall now explain.

"When a mower ſets about cutting down a crop of oats, he places himſelf ſo that the corn is at his right-hand, from whence the action of the ſcythe throws the waving towards his left. The mower of wheat, on the contrary, proceeds from outſide to inſide, ſo that the corn which he is next to cut is always at his left-hand; and that which he has juſt cut, being collected by the bender, is reſted, inclining a little, againſt the adjoining uncut part.

"A helper, which may be a boy of twelve or fifteen years of age, or an elderly woman, follows the mower at the diſtance of four or five feet, with a reaping hook, or a ſtick about a foot and a half or two feet long, and, by putting that through the interval between the ſloping late cut wheat, and the ſtanding corn againſt which it reſts, takes up the former, gives the ſtraw ends a gentle ſtroke or two upon the ground, to form that parcel into a grip, and lays it down at his right hand. This ſhould be done very expeditiouſly, becauſe the picker-up, as this perſon is called, is followed by another mower; and it ſhould alſo be done dexterouſly, becauſe the greater or leſs quantity of gleaning depends thereon. There ſhould be as many pickers-up (we call them binders,) as there are mowers.

"The poſture of the mower is a circumſtance of ſuch importance, that I think myſelf happy in having taken particular notice of it in 1754. In cutting graſs and oats, the mower goes in ſuch manner that his feet, which are moved alternately at each ſtroke of the ſcythe, deſcribe two parallel lines. But in the mowing of wheat, the mower's track ſhould be upon a ſingle line, ſo that his right foot, which ſhould be foremoſt, be driven forward by the left, at each cut of the ſcythe; not unlike the attitude of a fencer when he advances.

"An accident which had like to have over-ſet my whole operation in the year 1754, demonſtrated to me the neceſſity of this different poſture. I employed for mowing my wheat, men who uſed to come yearly to cut down my oats: they were ſeven in number. On the third day of their labour, five of them fell ill; upon which I ſet three others to work: but the conſequence was, that I had ten ſick people to take care of at the end of the week. I viſited them, inquired into their ailments, and found, that ſome of them had a fever, but that all of them complained of violent pains and ſoreneſs under their left ribs. At firſt, I was inclined to think them pleuritic; but, upon a cloſe examination, and upon conſidering the nature of the work they had been at, I ſaw that their illneſs proceeded from badly managed hard labour, the ſtreſs of which had been made chiefly on the left ſide. I therefore ordered them to take their reſt.

"The next day, upon viſiting my infirmary, I found that two of the mowers were returned to their work. I went out to them, and ſaw, even at ſome diſtance, that their poſture in this work was the ſame as if they had been mowing of oats. This immediately ſhewed me the cauſe of their pains. The ſcythes which they then uſed had the common ſort of hooks, and were much heavier than thoſe with only wicker benders. I took up one of them, put myſelf in the poſture of a mower of oats, and ſhewed them, that as a much greater weight reſted upon the hooks of the ſcythe when they mowed wheat, than when they cut oats, it was not poſſible for them, in the poſture they had choſen, to move that increaſed load to the left, without an irkſome twiſt of the body. Then, putting myſelf in the poſture of a fencer, as I had ſeen my Flemiſh mowers do the year before, I demonſtrated to them, that the body was thereby placed in ſuch an attitude as enabled it to exert the greateſt ſtrength, when, by the motion from right to left, it had the greateſt load to ſupport, and that, by the ſame means, this load was carried round without fatiguing the ribs of either ſide. My man took back his ſcythe, tried as I had directed, was convinced of the truth of my demonſtration, taught his companions the ſame method, and they have done their buſineſs eaſily ever ſince. I thought it neceſſary to re-

late the circumſtances of this accident, becauſe I am ſatisfied that even the ſtrongeſt men would ſink under the labour of mowing wheat, if they were to ſtand in the ſame poſture as the mowers of oats.

"Such is the manner in which this operation ſhould be performed, when the corn ſtands upright, that is to ſay, in the moſt favourable years. I ought to add, that the mower ſhould take care to place himſelf, for his work, in ſuch manner that his left hand may be toward the wind. The corn is then naturally inclined over the ſcythe, and is the more eaſily cut cloſer to the ground. The reſiſtance of the wind, be it ever ſo little, helps to keep the corn which is cut ſteady upon the benders of the ſcythe, and facilitates the motion which reſts it againſt the uncut corn, where the binder takes it.

"The mower is not hindered from mowing cloſe, by the wind's blowing at his back; but the corn which he cuts will not be ſo exactly collected by the bender: ſome of the ears will be a little ſcattered: but the greateſt inconvenince is, that it does not reſt ſo well againſt the ſtanding corn, but is often blown down; which renders the binders work ſlower, and more troubleſome, and occaſions greater gleanings.

"The wind is in a bad corner for the mower when it blows in his face. It then occaſions a loſs of ſtubble, and a great diſperſion of the ears.

"But the worſt of all winds for this work, is that which blows upon the right hand of the mower. The ſtubble then remains long, and ſo great a quantity of ears lies ſcattered about, that one would hardly think the ground had been harveſted. My mowers did not place themſelves in this manner of their own accord: but I made them do it for a quarter of an hour, to try the effect, of which I am fully convinced.

"When the corn is inclined, or bent, the mower takes it in the direction of its bending, from left to right; which has the ſame effect in calm weather, as if the wind blew towards his left.

"Corn which is lodged cannot eaſily be mowed inward, becauſe the binder would be inceſſantly impeded by the intangling of his grip with the uncut corn. A good mower judges by his eye, which part it is moſt proper to begin at, and takes advantage of the wind when it can be of ſervice to him. The method which I have ſeen moſt commonly practiſed, has been by taking the corn in the direction of its bending, and throwing it in waves. The work thus done is neatly performed: no remains of ſtubble are ſeen after the mowing; but the field looks like a meadow.

"Corn laid abſolutely flat, and intangled, is the moſt difficult to cut well. I have ſeen a mower take it in every various direction in which it was beaten down, as if the wind had been conſtantly at his back, and by this means he has cut as cloſe as if it had been only lodged. My wheat was in this condition in the year 1757, and was mowed very regularly: only the work was ſomewhat longer about, than it generally is in other caſes.

"I ſhall not ſpeak of rainy ſeaſons till I come to the objections againſt this method of cutting corn; becauſe they have nothing to do with our mowing, and the only thing requiſite in ſuch caſes is to keep the corn from ſprouting in the ear: but I ſhall here relate the advantage which I find in this practice.

"The preſervation of my fellow creatures is ſo dear to me, that I look upon the means of leſſening their exceſſive hard larbour at a time when the heat alone is enough to over-power them, as the firſt and greateſt advantage reſulting from this method. Now I ſee that a good reaper, with his ſickle, can ſcarcely cut an acre of wheat in a day, let him toil ever ſo much; whilſt the mower will diſpatch from an acre and a half to upwards of two acres, according to his ſkill and dexterity. I have, indeed, met with but few able to exceed two acres, when they have done their buſineſs well: but we may reckon that a good mower, taking them one with another, and the corn as it runs, upright, lodged, intangled, &c. will clear an acre and a half, or perhaps an acre and three quarters, in a day, neatly, and without waſting any of it. This mower does then three fifths more work than a reaper can. It is true, he has not the grips to tye up, becauſe the perſon who follows him does that part: but he is obliged to whet his ſcythe when he comes to the end of the field, and ſtill oftener when the corn does not grow thick; beſides which, notwithſtanding all the care that can be taken to clear the ground of ſtones, not a day will paſs without his meeting ſome, which will oblige him to have his ſcythe new hammered; and laſtly, when he has finiſhed a row, he muſt go back to the other end of the field before he can begin another. All this takes up at leaſt as much time as the reaper's binding up what he has cut: and in regard to the hardneſs of the labour on each ſide, I believe that every one who rightly conſiders the nature of their reſpective works, and their poſtures in working, will allow, that the mower's toil and fatigue is three fifths leſs than that of the reaper.

"Another circumſtance, well worth attending to, in this method is, that the mower is not expoſed to thoſe injuries from thiſtles, thorns, and other noxious plants, which often prove fatal to the reaper.

"From the firſt of theſe advantages reſult ſeveral benefits: 1, A greater riddance of the neceſſary work. Not a year paſſes without the huſbandman's experiencing that ſome part or other of his corn ripens too ſuddenly; and this unexpected maturity, being exceedingly heightened by the leaſt delay, occaſions a great waſte, by the ſhedding of the grain, both when the crop is reaped with the ſickle, and in loading and unloading it when carried home: whereas the ſcythe, by clearing in two days a field which could not be reaped in leſs than five, in the common way, guards againſt that exceſſive ripeneſs.

"2. This method of cutting down the corn requires fewer workmen.—I muſt here explain myſelf; becauſe the fact would contradict me, if it be objected that a mower and a binder are neceſſary in this way, for what the reaper alone does in the other. But I conſider, that to harveſt ninety acres, for example of wheat, I muſt employ ten men at leaſt twenty days, with the ſickle; whilſt ſeven mowers, and their binders, (fourteen people) eaſily do my buſineſs in ten days. The difference then is equal to ſixty days work of one man: and if I do not intend to get my harveſt in quicker with the ſcythe than with the ſickle, I take but four mowers and four binders, eight perſons, of which the four laſt ſtand me in leſs expence than three reapers; becauſe I employ for this buſineſs young people who would not be ſtrong enough to reap with the ſickle. Conſequently I have two workmen the leſs, and ſome advantage in the compariſon between the grown-up man, who has a higher price, and the lad, who anſwers my purpoſe.

"3. The

"3. The thus employing of children, old women, and men whoſe conſtitution is not robuſt, would be an advantage to the inhabitants of the place. It would afford the means of ſubſiſtance to a greater number of people, and prevent idleneſs and beggary; an important object upon many accounts. Almoſt every pariſh would find within itſelf hands enough to get in its harveſt, without being obliged to have recourſe to accidental paſſengers, who often work badly, require exorbitant wages, and ſometimes leave their maſter in the middle of the harveſt, if they do not ſubmit to their unconſcionable demands.

"Let us leave ſpeculation, and notice ſome advantages which are evident beyond contradiction. 1, It is not a ſmall one to have a greater quantity of ſtraw, and that ſtraw intermixed with more graſs and other fodder, than when the corn is reaped in the uſual way. This does not need any proof; for every one knows, that the ſcythe cuts as cloſe to the ground as the mower pleaſes. Experience has ſhewn me, that the ſtubble has not been left two inches long upon our mowed fields, where the ſtones had been carefully picked off; whilſt the ſickle generally leaves it eight or nine inches long, and ſometimes much more when the ground is infeſted with thiſtles and other ſtubborn growths, which make the reaper lift up his hand to avoid them. The ſtraw is therefore plainly ſix inches longer when cut with the ſcythe, than with the ſickle; a difference which may be valued at a ſixth part more than that which is uſually reaped in the common way.

"2. The green fodder in the mowed fields ſhoots up anew when cut, and affords excellent paſture after the corn is taken off. The ſame demonſtrative evidence as before, will again take place here with thoſe who but conſider, that the reaper, leaving the ſtubble either eight or nine inches long, takes off only the very tips of the graſs which chance to be within his grip; ſo that being then near its time of maturity, it ripens its ſeeds, ſows them, and withers away: whereas, when the ſcythe cuts it within two inches of the ground, in its greeneſt and moſt un-ripe part, the yet remaining eyes, and the crowns of the roots, ſend forth new ſhoots, which form a good after-crop for cattle.

"3. The paſture upon fields mowed with the ſcythe, is attended with an advantage, in regard to cows, which may perhaps be peculiar to my country. I know not whether it be the ſame elſewhere. We find every year, and I have always taken particular notice of it, that our cows ceaſe to yield milk during the firſt week of their feeding among the wheat ſtubble. I take the reaſon of this to be, that the ſtubble gets into their noſtrils, pricks them, hinders them from feeding, and makes them range the whole field over in queſt of graſs unattended with this irkſome inconveneince; ſo that they ſpend their time in running about, without grazing. I do not find that this accident happens to cows which are turned in among the ſhort ſtubble left by the ſcythe: the graſs there ſoon ſhoots up a-new, and yields me plenty of paſture, eſpecially if a little rain happens to fall after harveſt.

"It reſults from hence, that the huſbandman is enabled to feed more cattle than he could otherwiſe do, to ſave his ſaintfoin or lucerne, and to have a greater quantity of dung; as I have experienced with almoſt incredible ſucceſs.

"I now proceed to the objections, which I ſhall ſtate in the ſame order as they were made; that is to ſay, as each year gave room for one or other of them.

"The firſt was, that the ſcythe muſt make the corn ſhed very much by ſhaking it conſiderably. To affirm the contrary may ſeem paradoxical; though the aſſertion will be proved from manifeſt principles, and by facts. To judge rightly of my propoſition, it will be neceſſary to compare the operation of the ſcythe with that of the ſickle; both of which I have examined very attentively.

"The reaper preſents his hand to the corn, and with wide extended fingers, graſps as much as he poſſibly can; after which, to bring the lower part of the ſtalks ſo cloſe together that the ſickle may encompaſs the whole of his grip, and at the ſame time to give it a tenſion which renders the action of the ſickle more certain, he gives it a violent ſhake and at that inſtant cuts it. The grip thus cut is generally intangled with the ſtanding corn; or the reaper, when going to lay it down, finds that he has miſſed cutting a ſtalk, or perhaps more, which he then breaks with a jerk of his hand. Thus ſeveral ſhakes precede that which the corn receives afterwards when it is tied up.

"The ſcythe has not theſe effects. I have already explained the mechaniſm of its operation, and ſhewn that the corn cut without any violent ſhake, is carried gently by the bender (or cradle, as we more commonly call it) upon the ſcythe, to the ſtanding corn, againſt which it reſts inclined till the binder takes it away to tie it up.

"To prove my propoſition by facts, I inſtance the following. After my wheat was mowed in the year 1752, in the manner before related, upon the three ſeveral ſpots of ten acres each, which were parts of much larger fields, I went, with four other perſons, purpoſely to examine with all the care we could, what quantity of grain might have been ſhed by the mowing. We found none at all in the two firſt mowed pieces; but a great deal in the other parts of the ſame fields which had been reaped with the ſickle. In the laſt piece, which was not cut till the corn was riper, we found a little grain in the mowed part, but incomparably more in the other. I did not repeat this ſearch every year with the ſame care, becauſe I had not always the ſame conveniencies of making a compariſon: but I have ſeen enough to be certain that no grain is ſhed unleſs the corn be exceeding ripe, and that much leſs is then loſt by the ſcythe, than by the ſickle.

"The following more important objection was afterward made by a ſenſible huſbandman, who obſerved to me, that, in a rainy year, the corn cut after this manner muſt be more liable to grow in the ear, than that which is reaped in the common way, becauſe the heads of the grips not being ſupported here by a pretty high ſtubble, the wet cannot well drain off; and that the grain will imbibe a great deal of moiſture from the graſs underneath, when the ear is beaten down upon it by rain, which will render it very apt to ſprout as ſoon as the ſun ſhines upon it. had been told how to guard againſt this accident, but did not try the method till the year 1756, when it anſwered perfectly well.

"This method conſiſts in laying the grips in a triangular form, ſo that the head of one reſts upon the oot of another. This operation is neither long nor fatiguing; nor does it require, in order to do it quick, any thing more than a little dexterity in cloſing the triangle, by making the foot of the third grip ſupport the ears of the

firſt. The rains which fell during the harveſt of 1756, rendering the getting in of that year's crops extremely troubleſome, my neighbours had a great deal of ſprouted corn, but mine eſcaped by this method; and what little I had, proceeded from that which remained unmowed when the rain became inceſſant.

"With regard to the ſheaves, when bound, my Flemiſh mowers informed me, in 1753, of their practice when they are overtaken by laſting rains. It is, to heap upon one another, ends to ends, as many ſheaves as they can poſſibly cover with one, which is then opened and laid over them. My people did not practiſe this method, which I believe the beſt; but they ſecured my corn by other means, which anſwer extremely well, and are generally known.

"From the above objection my huſbandman derived another, relative to the difficulty of drying the graſs and weeds intermixed with the corn, in rainy years, and the danger of houſing the ſheaves when full of that traſh, which may ferment and be the occaſion of the rotting of a whole pile of wheat. I cannot anſwer this objection otherwiſe than by experience. The harveſts of 1756, and 1757, were certainly not favoured by the weather: yet all the wild growths which were cut down with, and bound up among my ſheaves, were well withered when they were houſed. No ſort of ſmell which indicated the leaſt fermentatian was perceived in any of my barns; the threſhers did not find any thing that looked like it; and the ſtraw which is taken from thoſe barns, to feed my horſes, atteſts that there was not any.

"I now come to the laſt objection; by ſo much the more ſerious, as it is one of thoſe inconveniencies which I cannot remedy, but to which I readily ſubmit. The ears of the corn, ſay the objectors, do not lie ſo even in your grips, as in thoſe which are reaped with the ſickle: ſome of them are in the middle, and others at the very bottom of the ſheaf; ſo that your corn is not threſhed ſo well or ſo regularly, and you thereby loſe perhaps a conſiderable part of it. 2. All the graſs and weeds contained in your ſheaves are threſhed with the wheat, and their ſeeds are mingled with the corn when the threſher meaſures it out: conſequently you pay him for threſhing this traſh, which again increaſes the labour and pay of the winnower.

"All this is true: but let us diſcuſs the matter a little more thoroughly. There are ears in the middle and at the bottom of my ſheaves; but they ſeldom are of any other kind than thoſe which we call backward or late ears; the weak productions of ſickly plants, or of ſeeds not perfectly ſound. Repeated examinations have convinced me, that very few others are in this caſe; and theſe ears hardly part with their grain at any time, in whatever manner they are threſhed; for though the grains be torn from of them by the action of the flail, the inmoſt huſk ſtill adheres to the corn. Theſe diminutive imperfect grains are ſo great a detriment to the fine plump, well nouriſhed corn, that they leſſen its value if not carefully ſeparated by winnowing; after which they ſerve to feed poultry. If theſe ears eſcape the flail, the ſtraw is ſo much the better. Our horſes and other cattle reap therefrom a benefit which we ought not to grudge, becauſe, I think, it turns to our advantage.

"The threſhed graſs and other wild productions, do indeed yield a conſiderable quantity of what are commonly called bad or uſeleſs ſeeds, for the beating out of which I pay the threſher. But the graſs which occaſions this expence, ſaves me that of a great deal of ſaintfoin and lucerne which my cattle would conſume: and it would be unjuſt in me to complain of the additional charge in the winnowing, ſince my manager has thought of applying thoſe ſeeds to domeſtic purpoſes, ſuch as feeding fowls, &c. which prove more profitable to me than an equal quantity of the fineſt corn.

"A real increaſe of expence, is what I pay the threſher beyond the common price of the country. This difference, which conſiſts in two-pence or three-pence for a quarter of wheat, is but a juſt compenſation for his extraordinary trouble in unbinding and binding up again perhaps an hundred and fifty ſheaves, and ſometimes more, for what an hundred ſheaves generally yield, when reaped in the common way. But this expence is ſo amply repaid by the extraordinary quantity of ſtraw obtained by my method, that I rate the difference at more than the value of five quarters of corn, which, to ſilence contradiction, I will ſuppoſe to be otherwiſe loſt in my practice. Still my crop is cut down and houſed with far leſs toil and expence, than if it was reaped."

"They begin ploughing in the Iſle of Thanet, ſays a correſpondent of the editors of the Muſeum Ruſticum, about the firſt week in November, contriving ſo that the wheat ſeaſon may be over by the end of the month.

"In the ſpring, if the wheat is rank and the weather dry, they feed it down with their ſheep, which they think makes the wheat branch more, and ſettles the earth about the roots of the plants. Experience has convinced them, that this method of ſowing wheat after trefoil, is better than ſowing it on a fallow; for the land hereabout is naturally very light and hover, and the wheat on that account very much ſubject to be root-fallen. To prevent this, it is no uncommon thing for them, as ſoon as they have ſown their wheat, to drive a flock of ſheep over the land, to ſettle the earth cloſe to the ſeed.

"Their crops of wheat here are generally three, four, and five quarters on an acre; which laſt is, indeed, a very large crop, when it is conſidered, that the land is in general, by nature, poor and barren, and that it is almoſt entirely owing to the induſtry and good huſbandry of the farmers that it is at all brought to bear wheat: in fact, they are an aſſiduous people, and ſpare neither coſts nor labour to improve their land.

"On the light land here they for the moſt part ſow about fourteen pecks on an acre, but on the richer lands they allow four buſhels.

"The farmers here never ſow the ſeed produced by their own land; they find their wheat ſucceed much better by change; for which reaſon the ſeed which they ſow on the light hover-land they chuſe to procure from a gravel or deep cledge, or clay land, taking care that the ſoil on which the ſeed has grown ſhould be as different as poſſible from that on which it is to be ſown.

"Inſtead of making artificial ſteeps with great parade, they make uſe of that which providence has put in their way, wetting their ſeed with ſalt water, which they fetch from the ſea; and they afterwards ſprinkle it with lime, to prevent the ſmut: they are alſo particularly careful to clear their ſeed from wild oats, cockle, &c.

"I know no part of England where there are better farmers; for though they keep their lands conſtantly cropped without fallow, which they call ſowing a round tilth, yet do they ſo manage matters, as to keep them ſtill in good heart.

"They

"They reap their wheat very high here, leaving as much ſtraw as poſſible in the field: this they ſay they do to ſave barn-room. Some farmers here have a practice of ſowing rye to make bands for their ſheaves, the ſtraw being longer, and as they think tougher, than that of wheat. The reaper makes the bands, which he cuts as low as he well can, and binds the ſheaves.

"The wheat ſtubble, which, as I ſaid before, is left very long, is generally mown for the maltſters, as they burn it in their kilns to dry their pale malts for the London market. The greateſt part of this iſland is a light chalky ſoil, ſo that wet ſummers in general agree beſt with it; and it is by this means the farmers here get ſo much money: for when the crops fail in other parts of the kingdom, they are almoſt ſure here to be very large; and they have the great convenience, beſides, of water carriage to the London markets. It is extremely pleaſant, towards the latter end of the ſummer, before harveſt, to ride over this little iſland: I do not imagine there is a more improved ſpot in the kingdom; the fields are all kept ſo clear from weeds, that they reſemble a well kept garden; they grudge no expence in hoeing, weeding, ploughing, or manuring: and experience has long ago convinced them that they purſue a right method. Their practices are many of them good and worthy imitation; it would therefore be great pity if they were not made known, by ſome means or other, to the reſt of the kingdom." *Muſeum Ruſticum, vol.* I. *page* 3.

"It is now upwards of ſeven years that I have been tenant of a conſiderable farm in Eſſex; but as there are ſome particular circumſtances attending this farm, I muſt beg leave to ſay a few words on the ſubject.

"The ſoil, which is, for the moſt part, a fine mellow loam, or what is in general called a good wheat ſoil, was in very good heart, and not impoveriſhed; yet the laſt tenant broke on this farm, and the landlord loſt by him near two years rent; for his crops of wheat were continually damaged by ſmut, let him take what care he would of the ſeed, and were beſides often laid, and the land got very foul, though he was not ſparing of his fallows.

"On the contrary, ſince I have occupied this land, it has borne large crops of good ſound wheat, with very little ſmutty corn, and barley, oats, peas, beans, and other things in proportion. What will appear ſtill more ſurpriſing is, that I do not lay on half ſo much dung as he did.

"It will now, perhaps, be neceſſary to explain this ſeeming paradox. At no great diſtance from the farm lives the landlord, who is a man of fortune, and drives a ſet of horſes. This gentleman keeps no land in his own hands, ſo that he was for many years obliged to buy all the ſtraw uſed for the litter of his ſtables, which amounted to a very conſiderable quantity: however, when the laſt tenant of this farm came into it, having been a ſervant in the family, he offered to ſupply the eſquire with ſtraw for his ſtables, provided he might have all the dung, except what the gardener had occaſion for. The 'ſquire thought this a good propoſal, and the farmer imagined he had the beſt of the bargain; ſo the matter was ſoon ſettled.

"Now, you are to underſtand, that the 'ſquire kept, beſides ſeven coach-horſes, a ſtable of hunters, a number of road-horſes, and a pack of hounds; ſo that there was made on his premiſes, in a year, an incredible quantity of rich dung.

"The farmer imagined he was now in a fair way of making his fortune; for his father had taught him, that the man who can command dung is always ſure of large crops: but this did not prove true in the preſent caſe.

"To proceed; my predeceſſor went on ploughing his land, got his fallows in good order, dreſſed them largely with dung, and always ſowed them with wheat.

"His crops of this noble grain, however, by no means anſwered his expectations: his wheat conſtantly looked well and promiſing in the winter and the early part of the ſpring of the year; but as it advanced, it grew rank, and at harveſt was either run all to ſtraw, and was beſides very ſmutty, or elſe, if a heavy ſhower of rain happened to fall, it was lodged, matted, and grew. This was indeed a very mortifying circumſtance, but our farmer could find no remedy for it. He ſeveral times, without ſucceſs, tried folding ſome ſheep on his wheat; but this part of huſbandry, for want of ſkill, he managed ſo badly, that he loſt two entire crops, for he had ſcarcely the return of his ſeed at harveſt. This could never hold long; ſo that in the end he was, as I ſaid before, broke and ruined.

"This man never could be perſuaded that any part of his loſs was to be attributed to the dung he laid on his land, though he conſtantly manured it with the horſe-dung before it was half rotten, and without any mixture to allay its great heat; this kept the ſoil in a conſtant ſtate of fermentation, and ſtocked it with weeds, inſomuch that, when I took poſſeſſion of the farm, ſome of the ſoil was abſolutely mouldy, and ſtunk again, it was ſo rank.

"I will now inform you of my method of management, that you may be enabled to judge how far I was benefited by the errors of my predeceſſor.

"I found ſixty acres of fallow ready for ſowing with wheat: theſe, as the land was rank, I ſowed with the winter tare, which I knew, by experience, would choak the weeds, and abate the rankneſs of the ſoil. In ſome parts, where the ſoil was not ſo rank, I ploughed in the tares in order to ſow wheat over them; in other parts I ſuffered the tares to ſtand for a crop, which, however, was not conſiderable, they ran ſo much to ſtraw or haulm.

"When the tares were off, I got the land inſtantly in order, and ſowed the whole with wheat, of which I had a better and cleaner crop than had been known upon the land for upwards of ſeven years before: this all my neighbours acknowledged: however, it was neither clean enough, nor conſiderable enough, to ſatisfy me. Some of your readers may perhaps wonder what I did with my tares, as but few are ſold at the country markets; but I muſt inform them, that I live within ten miles of a ſea-port town, whither I ſent them at various times, in order to their being carried by ſea to London.

"I am to obſerve to you, that I continued the agreement of giving the 'ſquire ſtraw for his dung; but I made a uſe of it very different from my predeceſſor.

"I make it a rule never to manure for wheat, or ſow wheat on a fallow. I do not indeed allow many fallows on my land; and when I do, I generally ſow my fallow with barley, to which I allow four or five ploughings. This commonly yields me a large return, and I have a good crop of wheat after it.

"This, however, is not my general method; for I am very fond of the hoeing huſbandry, to practiſe which, in ſome degree, is the only infallible way of keeping land clean.

clean. To begin then with my method, I never lay dung alone on my land, let it be ever ſo rotten; but as ſoon as I get any long dung from the 'ſquire's, I carry it to my compoſt-heap, where it is mixed in alternate layers or beds, with freſh virgin earth, (if I can get it) lime, or chalk, lime-rubbiſh, ſcourings of ditches and ponds, turf, leaves of trees, and all the dung and offal of my family, of the hog-yard, the poultry-yard, and the dog-kennel. As to my pigeons dung, I always preſerve it to mix with ſoot, and uſe the mixture as a top-dreſſing for my wheat, whenever it happens to be too backward in the ſpring.

"But to return to my compoſt: I have always ſeveral diſtinct heaps of different ages, and I ſometimes leave it three years before I uſe it, and never lay on any under two years old.

"When I have got a plot of ground in order, I give it a thorough good dreſſing of this compoſt, which I immediately plough in. I then ſow it with ſome crop that requires hoeing, ſuch as horſe-beans, broad-beans, or white or grey peas. During the whole ſummer, I take care to keep theſe crops very clean by hoeing, eſpecially if the ſeaſon is rainy; and I am particularly cautious in preventing any of the weeds from perfecting their ſeeds.

"When my hoeing-crop, which generally more than pays me all my expences, is off the land, I immediately get it into as fine tilth as I poſſibly can, by repeated ploughings, and then ſow it with either wheat or barley, whichever is likely to pay me beſt; for little as ſome of your readers may think of it, barley, when it is ſown on good land well prepared, is very frequently as profitable a crop as wheat.

"By thus ſowing my wheat after a hoeing-crop with dung, I have always a good return of clean corn, often five quarters on an acre; and my land will ſtill be in heart enough to give me a reaſonable crop of oats; after which, without any fallow, comes my hoeing-crop, &c.

"When I ſow barley after the hoeing-crop, I ſuffer wheat to follow it; and then it is that, if I find it neceſſary, I give the wheat in the ſpring a top-dreſſing of ſoot mixed with pigeons dung.

"I ſometimes allow only ſix pecks of wheat-ſeed to an acre: this is when I ſow over it, in the ſpring of the year, eighteen pounds of broad clover-ſeed, which I harrow in with a pair of very light harrows; and it does not in the leaſt damage my wheat-plants. I leave the clover only two years on the land; for the ſecond year, after I have mown the firſt crop for hay, I ſuffer the ſecond to grow very rank, (having given my land a ſlight dreſſing from my compoſt dung-hill the preceding year) which I plough in, and over it ſow wheat, to be harrowed in on once ploughing.

"Theſe crops of wheat are ſmaller in quantity than any others I get, but the grain is finer, plumper, brighter, and heavier, generally ſelling for more at market, as being always very clean and clear from ſeeds of weeds.

"In my method of farming, ſome particulars are to be noted. In the firſt place, as my crops ſucceed one the other very quick, I am under a neceſſity of having all my ſtubble extirpated before I give the land the firſt ploughing after the crop is off. If it is a wheat or bean-ſtubble, I generally have it all pulled up by hand by women and children; barley and oat-ſtubbles I have torn up by a pair of loaded drags, and afterwards gathered into heaps and carted to the compoſt-heap. This I do to prevent the ſtubble from being buried by the plough, and from growing mouldy in the land; from which mouldineſs I have great reaſon to think ſmut often proceeds.

"Another thing to be noted is, that I allow leſs ſeeds to my land than moſt of my neighbours, my quantity being from ſeven to nine pecks of wheat, from nine to twelve of barley, and about twelve of oats to an acre of land; but it is always to be preſumed that the ſeed I ſow is good. If any farmer ſhould imagine that theſe quantities are too ſmall, let him ſuppoſe every wheat-plant to occupy a ſpace of ſix inches ſquare, which is ſmall enough: let him then calculate how many ſuch ſpaces there are in a ſquare acre. When he has done this, let him proceed to count how many grains of wheat there are in a pint, which multiply by the number of pints in nine pecks, and he will find by the reſult that I, in fact, allow too much ſeed." *Muſeum Ruſticum, vol.* V. *p.* 104.

"I have, for ſome years laſt paſt, held a conſiderable farm in the county of Leiceſter, and have, thank God, met with ſome ſucceſs in my practice.

"My methods of farming are thought by many to have ſomething peculiar in them; yet, as I do not often miſcarry, no one has a right to find fault with me.

"Great part of my farm is very good wheat land, the ſoil being a ſubſtantial loam.

"I frequently, as well as the reſt of my neighbours, make uſe of lime as manure; but then I uſe it differently from what they do.

"The common practice is, to lay about forty buſhels of unſlaked lime on an acre, which makes a peck on every ſquare perch, (half a buſhel when it is ſlaked.) On wheat land they ſpread the lime at the ſame time they ſow the ſeed; but this is a way I do not much approve, and for this reaſon I vary my practice. The method I uſe is as follows: I ſow my wheat without laying on any manure; but in the beginning of the month of February I get, for every acre of land I intend to lime, twenty buſhels of that manure, unſlaked, and forty buſhels of ſand, or the rubbiſh of a brick kiln.

"Towards the latter end of the month I cauſe the lime to be ſlaked, which doubles its meaſure, and very well mixed with the ſand; immediately after which, in the laſt week of the month, I have it ſcattered by way of top dreſſing over the green wheat; and as rain generally ſucceeds, it is ſoon waſhed down to the roots of the plants, and gives them a vigour and ſtrength of growth that is really aſtoniſhing to a perſon who had never ſeen this method practiſed.

"This is my way, if I ſee the weather is inclinable to be wet; but if it is dry, and not likely to rain, I double the quantity of ſand, in order to take away all danger of the wheat-plants being burnt, or hurt, by the ſtrongly corroſive power of the lime.

"The above method I would willingly recommend to the attention of your readers; and though I have benefited greatly by it, yet need they not take my word, as it is ſo very eaſy to make a ſmall trial, and form a judgment from the ſucceſs they may have.

"I muſt obſerve, that I look upon it to be almoſt a matter of indifference what kind of ſand I uſe, except that I prefer lime-ſtone ſand to the cryſtal ſand, as being moſt abſorbent, and in truth prefer the rubbiſh of brick bricks to either.

"It will perhaps be unneceſſary to tell your readers my

my motive for this preference; yet that I may not be thought obſcure, I ſhall do it.

"When lime is ſlaked, it crumbles and falls into very minute particles: the ſmalleſt of theſe particles are, together with the moiſture that adheres to them, abſorbed by the large open pores of the brick rubbiſh, which afterwards diſpenſes them by ſlow degrees to the ſoil on which it is laid, for the ſupport of the crop: this occaſions the operation of the lime to be more equal; the parts which were not abſorbed, are firſt attracted by the earth; theſe nouriſh the young plants, which, in time growing ſtronger, have power to draw from the abſorbent the particles it had reſerved for their uſe." *Muſeum Ruſticum, vol.* III. *p.* 366.

"Almoſt every part of this kingdom has a method of farming peculiar to itſelf; and this I have often found to be true, in the many journies I have made through various parts of the iſland.

"A ſhort time ſince my occaſions calling me down into the Weſt, I ſtopped for a few days in Wiltſhire, where I could not help obſerving, that the wheat-corn was remarkably backward, though it, in general, promiſed to be a good crop.

"I thought it worth my while to aſk ſome of the neighbouring farmers the reaſon of this appearance, when I was informed that moſt of the wheat was ſown late, owing to a wet autumn, which prevented them from giving their land the neceſſary ploughing for that crop ſooner than November, December, and even January.

"The ſoil is a pretty good loam, on a chalky bottom: and I found they often ſow late; but whenever they do it, they take care to allow an additional quantity of ſeed, generally one fourth, or a third, more than they uſe when they ſow early.

"I was alſo told, that many benefits often reſulted from ſuch late ſowing; particularly, the crop is generally clearer from weeds; for in early-ſown wheat, poppies, and other noxious weeds, are very apt to get a-head, and injure the corn. I even ſaw in my walks many early-ſown fields, which rather ſeemed to be under poppies than wheat, as the poppies were in full bloom, and made a glaring appearance.

"The Wiltſhire farmers, the beſt of them I mean, often give their land four ploughings for wheat; and they find their advantage, as it is by ſuch means brought to a fine tilth, and yields a good crop.

"Another advantage they told me they had from ſowing their wheat late was, that in the blooming ſeaſon the weather was generally fine; whereas in a wet ſummer, the bloom is often waſhed off from the forward-ſown wheat.

"But it muſt not be imagined this method of ſowing wheat late is indiſcriminately purſued: in many circumſtances it would be very imprudent to do it.

"This method of huſbandry muſt, to meet with ſucceſs, be chiefly practiſed on fallows, where the land is good, and has been well dreſſed.

"Every crop, and method, has dangers to encounter: and the chief danger of ſowing late is, that a froſt may come on juſt as the ſeed begins to ſprout; but then good land, well dreſſed, is not ſo ſubject to this misfortune as poor, unmanured land, that has, perhaps, been not half ploughed.

"I find, from enquiry, alſo, that it is dangerous ſowing wheat on clover lays on one ploughing only, unleſs it is done ſooner than the middle of November; for the turf or graſs lay, forms a cruſt immediately under the ſeed corn; and this not only prevents its taking a firm rooting, but alſo expoſes it to the ravages of field fowls, which are, at this ſeaſon, particularly voracious, as having a ſcarcity of food; and the infant plant is, beſides, liable to be killed by the froſt, juſt as it is about ſprouting and ſhooting out its firſt leaf. It ſtands, therefore, to reaſon, and is warranted by experience, that wheat ſhould not be harrowed in on a clover lay, on one ploughing, ſo late after the middle of November, as the danger is great, though the loſs may not always be certain." *Muſeum Ruſticum, vol.* III. *p.* 1.

"As I have been many years a farmer, it is not to be wondered at that I ſhould know ſomething of huſbandry.

"Experience, which is an excellent miſtreſs, has, in fact, beſtowed on me moſt of the knowledge I have acquired: I imagine, therefore, that an account of the reſult of this experience, will not be unexceptable to your readers.

"Moſt farmers chuſe to ſow wheat on a fallow; we, in Eſſex, on the contrary, often, not without good reaſon, avoid it. Every fallow deſigned for wheat requires a good dreſſing of rotten dung, or ſome other manure; and this dreſſing, we imagine, often is the cauſe of a ſmutty crop, if laid on uncompounded; therefore, whenever I ſow my wheat on a fallow, inſtead of laying on my muck-heap unmixed, I make it into a compoſt in the preceding ſpring: this compoſt conſiſts, according to the nature of the ſoil it is to be laid on, either of chalk, light earth, and rotten dung, or of lime, clay, and dung, laid in a heap, in alternate layers, or beds.

"This compoſt-heap I cauſe to be frequently turned during the courſe of the ſummer, till it is thoroughly mixed, and forms one united maſs of manure, rather crumbly than otherwiſe.

"With this manure I dreſs my fallows in the ſame manner farmers lay on their rotten dung alone; and I find, by experience, it is leſs apt to heat and canker the wheat-ſeed, and it is alſo much leſs inclined to mould and burn the ſeed.

"This, I ſay, is my method of management when I ſow my fallows with wheat as a firſt crop; but I more generally approve of making wheat the ſecond crop after barley, oats, beans, or peas.

"I am ſenſible many of your readers will be ſurpriſed at this method, and exclaim that it is impoſſible to get a good crop of wheat but after a good fallow; yet I know the contrary: it is from experience I know it; may I not therefore venture to aſſert it?

"When I intend to ſow wheat as a ſecond crop, I lay my due quantity of compoſt on the land ſome time before I ſow it with barley, oats, beans, or peas.

"When this crop is off, the following year I ſow wheat. You may ſuppoſe the land to be duly prepared by well-timed and careful ploughings; but I am to premiſe, that after beans and peas, being hoeing crops, the land is much ſooner brought into good tilth, than after oats or barley.

"The wheat ſowed the ſecond year of the fallow is, with me, generally a good crop, and almoſt always clear from ſmut and pepper-wheat.

"If, by any accident, the wheat ſhould be ſickly, or pining, after Chriſtmas, I beſtow on it a top-dreſſing of wood aſhes, ſoot, if I can get it, or coal aſhes, if the ſoil

happens

happens to be ſtrong: this ſeldom fails anſwering my expectations; checking the growth of the weeds, and forwarding that of the corn.

"It is very frequently that I ſow wheat in this manner for a ſecond crop; but when I have an opportunity of chuſing, which I cannot always do, as I muſt ſuit my crop to my wants, I prefer, for the firſt crop, beans or peas, either of which I take to do the land nearly as much good as a fallow.

"Neither peas, no beans, are, in my opinion, great impoveriſhers; and the frequent hoeing which they both require, if they are properly cultivated during their growth, brings the land into finer order than the beſt regulated courſe of huſbandry with the common implements could effect.

"Wheat ſucceeds particularly well after either of theſe two laſt-mentioned crops; and I have found, by experience, that if peas or beans, are made intermediate crops, and are well and properly hoed during their growth, land of a moderate quality may, without being impoveriſhed or hurt, be made to bear a continued ſucceſſion of crops for many years; but it muſt be underſtood that it ſhould, from time to time, be refreſhed with proper dreſſings of well-prepared compoſt.

"I know many farmers think there is no ſuch thing as carrying on a courſe of huſbandry without allowing, once in three or four years, a year of fallow; but ſuch are little acquainted with the benefit reſulting from hoeing crops: and it is this benefit that has of late induced farmers to ſow ſuch immenſe quantities of turnips in the counties of Norfolk, Suffolk, Eſſex, and other counties adjacent.

"Many of the advocates for intermediate fallows think that the earth requires reſt; but this is a great miſtake; for I could eaſily make it appear that, in a proper method of huſbandry, land might be almoſt continually cropped, without being impoveriſhed or worn out.

"The real benefit accruing from frequent fallows is, that they allow the huſbandman time and opportunity to bring, by good tillage, his land into proper order for the reception of the ſeed; but in the method of huſbandry I would recommend, the land would always be kept, by frequent ſtirring, in ſuch good tilth, that the time betwixt gathering the crops, and ſowing the next ſucceeding ſeed, would be abundantly ſufficient for any preparation it might require; for it is a well known fact among huſbandmen, that when land is well tilled and kept in good order, one ploughing will go much farther than three where the land has been neglected, is rough, and grown hard and cloddy, through inattention or lazineſs." *Muſeum Ruſticum, vol.* III. *p.* 3.

"A wet harveſt, ſays an old huſbandman, is what a farmer dreads more than almoſt any thing, as it hurts the quality of his corn, increaſes his expences, and greatly leſſens his profits.

"So much depends on the well getting-in of our bread-corn, that every man, who knows any thing that can forward ſo good a purpoſe, is, I think, in duty bound to communicate it for the benefit of the public.

"It is a well-known maxim that wheat ſhould be left for ſome days in the field, after it is cut, before it is inned: this, the farmers think, and not without reaſon, improves its quality; the dews plump the kernels, and the ſun brings it to a proper and perfect ſtate of maturity.

"Theſe then are the benefits that reſult from leaving the ſheaves for ſome time abroad; but it is neceſſary the weather ſhould be fine, or great loſſes are often the conſequence of this practice.

"Sometimes, when the farmer leaſt expects it, the weather ſets in foul, and it rains for ſeveral weeks ſucceſſively: it is then very difficult to preſerve the wheat from being greatly damaged, notwithſtanding the many contrivances that have been thought of for this purpoſe.

"Some ſhock their ſheaves, ſetting them up in thraves of ſix ſheaves of a ſide, and two to cap them; but this is a very dangerous method, and never to be practiſed after much rain has fallen: if the ſheaves were dry when the thraves were ſet up, from an expectation of its raining, it is of great ſervice; but if the ſheaves are firſt ſuffered to be wet, ten to one but the corn ſweats, ſprouts, and rots, by being ſo cloſe confined from the action of the air.

"After all, I am apt to think that it is full as well not to cap the ſhocks; for if the rain is not very heavy and conſtant indeed, the ears, provided they do not touch the ground, will dry nearly as faſt as they are wetted.

"In Middleſex, Kent, and ſome parts of Eſſex, they generally bind their wheat as they reap; but then it muſt be ſuppoſed that their crops are, for the moſt part, pretty clear from green weeds, which would otherwiſe cauſe the ſheaves to ſweat violently in the mow, and greatly damage the corn.

"When a farmer is ſo unfortunate as to have his wheat-ſheaves thoroughly wetted, if fine weather enſues, I would by all means adviſe him to unbind them, and afterwards ſpread them out to be dried by the ſun. This ſimple method will often prevent great loſſes, and the wheat may at laſt be got in in tolerable good order.

"If the rain, however, ſhould continue long, and there ſhould be danger of the kernels growing, which by obſervation he may eaſily judge of, I would adviſe the thinking farmer inſtantly to carry it home wet as it is, and afterwards manage it as I ſhall direct from my own frequent experience.

"When the waggon, or cart, comes home loaded with ſheaves, let them be thrown promiſcuouſly into the bay of the barn, and not regularly moved; for it is neceſſary they ſhould lie hollow, that the air may get into the vacuities, and prevent the ſheaves from heating during the little time they are to continue in the ſituation above deſcribed.

"Let our farmer next prepare ſome cutting-boxes, ſuch as horſe meat is cut in, in Kent, and ſome other counties. The number of theſe boxes ſhould be according to the quantity of wheat he has wet; but three or four conſtantly kept going will do a great deal of work.

"With theſe cutters, let the ears be cut off from the wet ſheaves; and when a ſufficient quantity is collected from all the boxes, let them be put looſely up in ſacks, and carried to a malt-kiln, there to be regularly and gradually dried; and when the firſt parcel is done, another is to ſucceed, and ſo on till the whole work is completed.

"This method I can, from my own experience, recommend to your readers; and it is leſs expence than would at firſt thought be imagined. The heat of the kiln may be kept up higher than when malt is drying, as the chaff of the ear will prevent the kernel of the wheat from being damaged by the fire, unleſs the heat is very intenſe

intenſe indeed: but it will, however, be proper to keep the ears gently ſtirred with a fork, or rake, during the time they are drying.

"In this management the farmer, will find great advantages; and his wheat will, with a very inconſiderable additional expence, be nearly, and ſometimes quite as good in a wet harveſt, as if it was houſed in ever ſo good order, in fine ſun-ſhining weather.

"If, by chance, after you have cut off the ears from the ſheaves, the weather ſhould change, and become fine, you may often dry them without the aſſiſtance of the kiln, by ſpreading them thin on a large threſhing-cloth, and turning them frequently with a wooden rake; and even, if by this method you ſhould not entirely dry them, it will ſtill bring them ſo forward that the kiln will eaſily complete the cure.

"I muſt, however, before I conclude, caution the farmer not to ſuffer the kiln to be much heated, unleſs the ears are kept conſtantly ſtirring during the time they are drying." *Muſeum Ruſticum, vol.* II. *p.* 106.

"Give me leave, ſays a practical farmer in Warwickſhire, to mention to you a practice which, however, I do not abſolutely recommend, though with me it ſucceeded, and, as I have been informed, has done ſo with ſeveral other farmers, who have ventured to make the experiment.

"A few years ago, after what I thought a good fallow, I ſowed a field, containing five acres, with wheat. The ſoil was a good loam, but rather light than ſtiff, and inclined to be ſtoney. The wheat plants looked healthy during the whole winter, and promiſed fair to yield me a plentiful crop; but in the ſpring, warm rains coming on brought ſuch ſtore of weeds, that my wheat was in danger of being choaked.

"I was for ſome time puzzled what to do; for it being now the latter end of May, and the wheat being on the ſpindle, and ſome even in the ear, to weed it with hooks would have been endleſs, not to mention the damage that would have been done to the plants by the weeders feet.

"I had at one time thoughts of mowing wheat and weeds all together, and drying them to make fodder for my cattle: intending, if I had done this, to have got the land as faſt as poſſible in order, and ſown it again with wheat the ſucceeding autumn.

"However, in looking over the field, I found no great deficiency of wheat plants; but they were in moſt places ſo over-topped by the weeds, as to be ſcarcely viſible, and in the furrows, in particular, not a blade of wheat was to be ſeen.

"My method of ploughing for wheat-ſeed in this land is, to make narrow ſtitches, but wider than a ridge, and more rounding, being not ſo ſharp on the back.

"Whilſt I was meditating what to do in this matter, a gap was by ſome accident made in the hedge, and a parcel of my ſheep got into the wheat field.

"As ſoon as I ſaw where they were, apprehending great damage, I ordered them to be immediately driven out, and the gap mended.

"On taking a ſurvey, I was not a little ſurpriſed to find that the ſheep, inſtead of doing any damage to the wheat, had done it a great deal of good, for they had eat up almoſt every weed which grew in that part of the field next to the paſture.

"Encouraged by this accidental diſcovery of a propenſity in ſheep to eat weeds rather than wheat, I turned a hundred of my flock, into the field, two or three hours in the morning and the evening, for ſeveral days together, till all the weeds were nearly conſumed.

"On inſpecting my field afterwards, I found the ſheep had done very inconſiderable damage to the wheat, but the weeds were eat down ſo cloſe that they could never again get a-head; the wheat going on proſperouſly, and yielding me at harveſt a plentiful crop of clean, good corn, which was more than any of my neighbours could that year boaſt of.

"Whilſt the ſheep were eating the weeds, I found they moſtly walked in the furrows, as being eaſier to their tread than the ſloping ſides of the narrow ſtitches; and this might be one reaſon of their doing the wheat ſo little damage by their treading.

"In this new method of huſbandry I took, however, one precaution, which I am apt to think, greatly contributed to my ſucceſs.

"The precaution I mean is, that I never let them lie in the fields at night, as the weight of their bodies when they lay down to ſleep could not have failed doing great damage to the plants." *Muſeum Ruſticum, vol.* III. *p.* 31.

"Permit me, ſays another experienced farmer, to communicate to your readers, for their benefit, I hope, a little of the experience I have in many years acquired.

"Being now grown old, and retired to ſpend the remainder of my days in this city, I trouble myſelf but little about the practical part of farming; yet did I ſome years ago occupy a conſiderable tract of ground in Norfolk.

"I ſhall, for this time, confine myſelf to the propriety and impropriety of feeding wheat down with ſheep in the ſpring; a practice which has by many been hitherto but little underſtood.

"This practice, when prudently adopted, is replete with many and great advgntages; but if indiſcriminately adopted, nothing would ſooner ruin a farmer.

"The advantages to be derived from it are, that it affords feed for your weathers and ewes after the turnips are conſumed, and before the ſpring feed comes in; it cauſes the wheat to tiller and branch more than it would otherwiſe have done, and of courſe produce a larger and better crop; it brings, by the rich manure it affords the land, the crop forwarder, and makes it heavier in the ſcale, as well as plumper in the buſhel.

"The diſadvantages attending this practice are, that, in certain circumſtances, it checks the growth of the corn, and makes the ſecond ſhoot diminutive and ſmall; of courſe the ears are lean and poor, and the crop in proportion. It gives the weeds an opportunity of getting a-head, and ruining the crop, to the farmer's great loſs and diſappointment.

"I ſhall, to be better underſtood, relate ſome caſes which happened to myſelf, as I find them noted in my journal, for I always kept one.

"In the year 1742, I had ten acres of wheat, which after Chriſtmas, ſeemed proud. The ſoil was a looſe loam, and I had, when I fallowed, laid on plenty of dung.

"I turned into this field a parcel of ſheep on the twenty-ſecond of January, in order to feed it down which they did; but the weather coming in milder than

I expected, the weeds which had been brought in with the dung, got ſuch a head, that I was above twenty pounds loſer by feeding it.

"In 1744, I fed, very indiſcreetly indeed, another piece of wheat of fifteen acres. The land was poor, and had not been well dreſſed, ſo that about the tenth of March, the wheat plants ſtood very thin. I turned in ſome ſheep, thinking it would afterwards branch more, and produce a better crop; but I was diſappointed, for the ſheep bit off the knot of the plant, and I had, I think, the worſt crop I ever reaped.

The next year, 1745, I had another thin crop of wheat on much the ſame land as the laſt: I turned in ſome ſheep the ſixth of February, before the knot was above the ground within reach, and it ſucceeded; for, as I gave it a good top-dreſſing within a fortnight, it tillered and branched ſo well, as to produce a much better crop than I expected.

"I could relate to you many other circumſtances of this nature, but it would take up too much room; I ſhall therefore proceed to make ſome obſervations on my general experience in this matter.

"I find wheat ſhould never have any ſheep turned on it, unleſs it is forward in January, and likely to be lodged at harveſt, except now and then, with great precaution when you want to thicken a crop.

"Such wheat only ſhould be fed down as was early ſown: and I hold it a bad practice if the land is rich with dung.

"Wheat ſhould not be fed down, unleſs the land is pretty clear of weeds, and has ſtrength and ſubſtance enough to afford the wheat nouriſhment in plenty, that it may get into ear at the proper ſeaſon, notwithſtanding the growth was ſo checked.

"There is in every plant of wheat a certain knot, or crown of the root as I call it, from which all the branches iſſue: now, if this crown is nipped off by the ſheep, a dwindled production is the certain conſequence; for this reaſon, ſheep ſhould never, (unleſs it is in a very backward ſeaſon, and then it will not be prudent to feed wheat down at all;) I ſay, ſheep ſhould never be turned on it after the middle of February: the beſt time, in general, is the latter end of January, or even the middle of that month.

"If ſeaſonable rains follow, provided the ground is clear of weeds, it will be greatly to the advantage of the farmer.

"If the farmer has the leaſt doubt of the ſtrength of his land towards giving the checked plant nouriſhment, I would by all means have him afford his wheat a top-dreſſing of ſoot, aſhes, malt-duſt, or whatever other proper manure he may have at hand, provided he is ſure it is quite clear of weeds.

"Let not the induſtrious farmer be at all uneaſy if, after feeding down his wheat, he perceives the plants ſtand at a diſtance one from the other; for if he has practiſed this piece of huſbandry, with the precautions above noted, he may depend upon it, that every plant will throw out a number of branches, and that he will have a field full of ſtalks at harveſt, and a crop that will ſurpriſe him.

"I am very fond of recommending wheat crops to the farmer's attention, not only becauſe it is the moſt noble of grains, but alſo becauſe, if well managed, it is the moſt profitable.

"We muſt not always judge the farmer's profits by the produce of his land; which ſome of our readers may think odd; but I will make it appear by an example from my own practice.

"In the year 1743, I had two fields, of twenty acres each, in wheat; one of which yielded me, at harveſt, at the rate of four quarters an acre throughout; the other yielded me only twenty buſhels, one acre with another; yet I got more by the laſt than the firſt. The caſe was thus: falling ſhort of dung, I was obliged to buy; but it was ſo dear, that I only bought enough for the firſt field, giving the other two ploughings extraordinary, inſtead of manuring it; and theſe ploughings I reckon at a mere trifle, as my horſes would otherwiſe have ſtood ſtill." *Muſeum Ruſticum, vol.* III. *p.* 151.

"I have often thought that it would be of great ſervice to the public, if, by any method, there could be determined a mean weight for any given quantity of corn, and likewiſe what number of grains, upon an average, ought to be contained in each ear, and the proportional weight between the ear, with the grains in it, and when taken out, and likewiſe the proportional difference between the weight of the whole ſtalk, including the ear and the grain.

"But in order to ſettle this medium, under our preſent conſideration, it will be abſolutely neceſſary, in the firſt place, to make accurate and impartial experiments for a number of years, and then, by comparing the produce and the weight, &c. of the whole, both ſeparately and together, we may come pretty near the mark in view.

"In order therefore to purſue the plan I had laid down, in the beginning of the harveſt of the year 1757, I got three acres of common red Lammas wheat out of —— field, Auguſt 26. I then cut off the ſtalk cloſe to the ear, which I weighed with the corn in it: I then weighed the grains when rubbed out of the ear, and cleared from the chaff: in the next place I compared the difference, and then counted the number of grains in each ear reſpectively; and at the end of every year ſet down the weight of a cubical inch of the product of that harveſt.

"But in order to give a clearer idea of my method of proceeding, I will ſet down the weight, &c. of the corn which was gathered from the firſt field, in columns, in the manner I entered it in a book kept for that purpoſe, which will be ſufficient to explain the whole without a multiplicity of figures.

Numbers of ears when and where got.	Weight of the ear with the corn in it.	Weight of the grain when free from the chaff.	Difference.	No. of grains in each ear.
	℥ gr.	℥ gr.	℥ gr.	
1757.	3 ℥ gr.	3 ℥ gr.	3 ℥ gr.	
Three ears got	1 0 1 5	0 0 19 5	0 0 5 5	28
in —— field,	2 0 1 2	0 0 17 5	0 0 4 5	27
Auguſt 26.	3 0 1 7	0 1 1	0 0 6	36
Total.	1 0 14	0 2 18	0 0 16	91

"I proceeded in the ſame method with each of the three ears taken out of fourteen other different fields, during the time of the ſame harveſt; then caſting up the ſum total of each column, and dividing their products by the

the number of ears gathered that ſeaſon, the quotient would give me the mean weight, &c. of an ear of that harveſt, and its number of grains, &c. &c.

"I then made a cubical veſſel containing exactly a ſquare inch; and having mixed all the corn together, I filled the above veſſel, and weighed its contents with the greateſt accuracy; which weight I ſet down, repeating the operation ſeven or eight times, having well mixed the little heap of corn together, after each trial, and then ſet down the weight of each as before: and as there would ſometimes be the difference of a grain or two more or leſs in each cubical inch, I divided the product of the whole by the number of times the experiment was made, and ſet down the quotient as the mean weight of a cubical inch of corn for that year, which in 1757 I found to be 3 dr. 12.3 gr. I have perſevered in this method every year ſince: but to avoid troubling you with the particulars of each, I will give you at one view the mean weight, &c. the number of grains in an ear, and the weight of a cubical inch for each of theſe laſt ſeven years paſt, and after that the medium of all taken together.

"I made uſe of apothecaries weights, upon account of the ſmaller ſubdiviſions of the ounce into drachms, ſcruples, and grains, which I have afterwards, in reckoning up the weight of the buſhel, reduced to troy, and averdupois. But we will now give the reſult of the ſeven years experiments in the following columns.

A. D.	Mean weight of each ear with the corn in it.	Mean wt. of the grains alone.	Difference.	Mean No. of grains.	Mean weight of a cubical inch.
	ʒ ℈ gr.	ʒ ℈ gr.	ʒ ℈ gr.		ʒ ℈ gr.
1757	0 1 10 5	0 1 5	0 0 5 5	38	3 0 12 3
1758	0 1 5	0 1 0 5	0 0 4 5	30 4	3 0 13 3
1759	0 1 8 2	0 1 2 4	0 0 5 8	37 6	3 0 14 5
1760	0 1 14	0 1 4 4	0 0 9 6	36 8	3 1 4 3
1761	0 1 9 5	0 1 4 5	0 0 5	36 6	3 1 4 3
1762	0 1 17 4	0 1 8 3	0 0 9 1	36 5	3 0 16 5
1763	0 1 10 1	0 1 3 3	0 0 6 8	35 5	3 0 17
Total	3 1 14 7	2 2 8 4	0 2 6 4	251 4	23 0 2 2
Mean wt.	0 1 10 67	0 1 4 05	0 0 6 62	35 9	3 0 17 457

The total divided by ſeven gives the mean weight, &c. &c. of the whole together, as in the preceding line.

"The firſt of the above columns (the date of the year not being reckoned) ſhews us, at one view, what we may expect a ſingle ear of Lammas wheat, ſeparated from the ſtalk, to weigh upon an average; and the ſecond what its produce in grain ſhould weigh when ſeparated from the chaff: the next diviſion gives the difference, being the weight of the ear and chaff alone without the grain; the fourth, the number of grains in each ear; and the laſt, the weight of a cubical inch; which latter we ſhall further conſider, and ſee what will be the mean weight of a buſhel, omitting the odd grains and decimal parts, as immaterial in ſo large a meaſure.

"As the ſtandard Wincheſter buſhel contains 2150.4 cubical inches, if the above weight of one, viz. 3 3 17.457 gr. be multiplied by that ſum, the product will be 73lb. 8 oz. 12 dwt. troy. But this ſtandard buſhel is in fact too ſmall, the real contents of a buſhel dry meaſure being 2178 cubical inches, which, according to that calculation, will give 74 lb. 7 oz. 19 dwt. which ſums reduced to averdupois weight will ſtand as follows.

Troy { 73 8 12 / 74 7 19 } equal to { 60 10 8 6 / 61 6 15 9 } averdupois

"But it will be proper to take notice that none of this corn was weighed till thoroughly dry, and ſeldom till the harveſt after it was got, and ſometimes later; therefore there muſt be ſome allowance made for the loſs of weight by keeping: which I found upon trial to be about four grains yearly in a cubical inch, and conſiderably more the firſt year, eſpecially if the corn happened to be got in a wet harveſt: therefore I think we may fairly eſtimate the mean weight of a buſhel of wheat, containing 2178 inches, to be about 62 lb. averdupois weight.

"I know that a buſhel of good wheat is, by the generality of writers upon agriculture, calculated at about 64 lb.; but our preſent enquiry is not whether it is good or bad, light or heavy of its kind; but what is the medium betwixt the two extremes, in order the better to judge of its qualities, according as it falls ſhort of, or exceeds, that determined weight.

"The fields out of which corn was gathered for the above experiments, are moſtly ſituated within a circle of ten or twelve miles round the town of Warwick, and ſome of them in Northamptonſhire; and in ſoils of different kinds, and ſuch as have been productive of good, bad, and indifferent crops.

"With regard to the obſervations, which I now offer to the public, they may be aſſured that they have been made with the greateſt accuracy, and, barring any errors in the calculations, without the leaſt deviation from the truth.

"My method of gathering the ears of corn was, to crop them ſtanding during the time of harveſt, always endeavouring, as near as I could gueſs, to take ſuch as were of a middling growth, avoiding the fulleſt ears, as well as thoſe which were ſhrivelled, or ſtinted. I therefore generally got them from about the middle ſpace between the ridge and the furrow; I then carefully wrapt up the produce of each field in ſeparate papers, to prevent the corn from ſhedding, or intermixing.

"The column which ſhews the difference between the weight of the ear with the corn in it, and that of the grains alone, is meant only as relative to the ear itſelf, without the ſtalk added to it, which latter was always ſeparated from it. But I have ſince made ſome few experiments with regard to the proportional weight between the whole ſtalk and ear, and its produce in grain; and I found the former to be to the latter as about ſixty-ſeven to ſeventy-two. But I cannot depend ſo much upon the juſtneſs of this calculation as of the others, it being only tried upon the produce of one harveſt.

"It muſt be obſerved that the weight of corn will vary more or leſs by keeping, according to the nature of the grain itſelf, the ſeaſons that it has had for its growth and maturity, and the dryneſs or moiſture of it when reaped: for notwithſtanding, it was before obſerved, that there may be an annual loſs of about four grains in every cubical inch upon an average, yet it may ſo happen that the weight of it may even be encreaſed by keeping, as was

really the caſe with regard to the corn which was got in the harveſt of the year 1762, after an exceſſive dry ſummer; for I found, upon weighing a cubical inch of the ſame corn, a year after the firſt trial, that it had actually encreaſed in weight 2.6 grains, which I can by no means account for, but upon a ſuppoſition that the corn contained in the ear, having been ſo thoroughly dried, whilſt ſtanding by the preceding heats and great drought, there was no room for any further evaporation of aqueous particles; but that, on the contrary, being laid up in this extreme ſtate of dryneſs, it muſt even imbibe moiſture afterwards, from the coolneſs of the place where it was repoſited; by which means the grain would become more plump than when freſh gathered, and would conſequently increaſe in weight. From hence the reaſon is very obvious, why corn that is thoroughly ripe, and well inned, will undergo a much leſs change by keeping, than that which has been plumpt up by preceding rains, though perhaps it may look better to the eye than the other. But I think it may be laid down as a rule, that the more the external coat of the grain is extended by redundant moiſture from within, the more will it appear ſhrivelled and wrinkled, whenever that moiſture is evaporated, which it muſt loſe upon being kept for any conſiderable time in a dry place: *therefore it will be moſt to the advantage of the* owner to have ſuch corn ſpent as ſoon as it is ſufficiently dry for common uſe, and not to hoard it too long in the granary, as the heap from the above-mentioned cauſe will be daily decreaſing.

"If further experiments of this kind were to be tried in other parts of this kingdom, and even in different climates; and if the reſult of each obſervation was to be compared with the others, we might probably come ſtill nearer to the medium which we have been aiming at; and the ſame trials might be made with any other ſort of grain." *Muſeum Ruſticum, vol.* II. *p.* 175.

"The experiments made by the above ingenious gentleman are very accurate, though, in my opinion, much too ſmall to determine matters of ſuch importance: but he has, I think, fallen into a miſtake that I alſo did in trying ſome experiments upon wheat, viz. in ſuppoſing that a middling ear is a ſtandard for computing the crop. This, indeed, would be the right rule, provided there was a regular gradation in the ears above and below the middle ſize: but, in fact, it is otherwiſe; there are generally more ſmall ears than large ones, and yet the corn in the large ears may weigh moſt.

"To explain this, let us ſuppoſe a perſon going to chooſe ſome middling ears as they ſtand in the field: he muſt do this either gueſſing by his eye, or by meaſuring ſome of the different ſizes, and taking thoſe of the middle ſize as near as he can. The ſizes can only be determined by their length and fullneſs: and if, for example; the longeſt are five inches, and the ſhorteſt one, the medium is three inches. Now, though thoſe of three inches are undoubtedly the middle ſize, yet, unleſs the weight and meaſure of the corn in the ears below three inches are equal to that of the ears above that ſize, the calculation of the crop from the three-inch ears will be wrong. This will be ſeen in the following tables.

"I once took an account of great part of a ſheaf of red Lammas-wheat; but having miſlaid my notes of it, I ſhall at preſent take notice chiefly of an experiment made upon white Lammas wheat, of the crop of 1762. The ears and ſtraw of this crop were in general very ſhort; but the corn was remarkably fine, full, and heavy. The wheat of this experiment was raiſed upon clover lay, and the crop about twenty buſhels upon an acre. A nine gallon buſhel of this wheat weighed above ſeventy pounds averdupoiſe, which is uſually reckoned the full weight of good wheat, though ſome will weigh more, as the beſt generally did that year.

"In February, 1763, I took ſome of this corn out of a middling ſheaf, and, as near as I could, of the middle-ſized corn: but it was taken out all together, and, without ſeparating of it. I ſorted what was thus taken out, into four parcels, nearly according to the length of the ſtraw, in order to diſcover the proportion between the ears and ſtraw of different lengths; but there ſeems to be little certainty in this.

"Theſe four parcels were weighed ſeparately ears and ſtraw together; then the ears by themſelves; and, laſt of all, the corn when ſeparated from the chaff.

"I weighed twenty of the firſt parcel by themſelves that had the longeſt ſtraw, and longeſt fulleſt ears: and afterwards weighed them ſingly, taking the weight and meaſure of each, as in the table.

"Being deſirous to know the weight and produce of the ears of different lengths, I ſorted each parcel according to the length of the ears, differing one from another about half an inch; and I weighed theſe ſubdiviſions ſeparately, noting the length of the ears, and the number of cheſts and grains in each. The length of the ears was meaſured from the bottom of the loweſt cheſt that had any corn in it, to the top of the ear. The longeſt ear was three inches and a half, but there being only one of that length, it is included among thoſe of three inches and a quarter. The twenty ears firſt weighed are included in the ſixty-three large ears in this laſt weighing.

"Several ears have ſome very ſmall grains in them: theſe are ſet dowh in the table, but not reckoned in the weight, becauſe I ſuppoſed them not marketable, and that they would go to the tailing, or off-fall corn. Of theſe ſmall grains two thouſand one hundred and eighty-ſeven weighed an ounce averdupoiſe. The reſt were weighed by troy weight, as below.

The weight of the four parcels.

		oz.	dw.	gr.
250 of the longeſt (the ſtraw	28 to 36 inch	18	18	4
500 of the ſecond ſize	24 to 32	26	17	10
250 of the third	20 to 26	11	7	20
250 of the fourth	16 to 22	5	4	18
1250 ears with the ſtraw		62	8	10

Twenty with the longeſt ſtraw, and longeſt fulleſt ears, weighed ſingly.

	Inches.	Cheſts.	Gr.		oz.	dw.	gr.
1 ear	$3\frac{1}{2}$	20	40				
1 do.	$3\frac{1}{4}$	18	41				
1 do.	$3\frac{1}{4}$	17	39	The corn in theſe twenty ears wd.	1	2	12
1 do.	$3\frac{1}{4}$	17	35				
1 do.	3	16	34	The chaff	0	5	15
1 do.	3	17	35	The ſtraw	1	0	21
1 do.	3	16	34				
3 do. each	3	17	101	The ears and ſtraw	2	9	0
10 do. each	$2\frac{3}{4}$	15 to 17	325				
20 ears		333	684	= 34.2 grains in each ear upon a medium.			

"In

"In the firſt of the following tables are inſerted the aſſortments of the four parcels, by the length of the ears, with the number of cheſts and grains in each, and the ſeparate weight of the ears, grain, and chaff. I muſt obſerve, that by accident I miſſed taking the diſtinct weight of the two hundred and fifty ſmalleſt ears: they are ſet down in the table as I computed them, in proportion to the third, or preceding parcel, which may differ a little from the real weight; but this cannot be much, for the weight of the whole parcel is right.

"In the ſecond table, the length, weight, &c. of the twenty largeſt ears, are ſet down in the firſt line: in the ſecond line are the ſixty-three large ears, including theſe twenty: and the third line contains the two hundred and eighty-eight ſmalleſt ears. They are ſet thus together to give the more eaſy comparative view of them. The next three lines of this table ſhew the weight, &c. of all the middle-ſized ears, and of all thoſe above and below the middle-ſize, brought thus together alſo by way of compariſon. To theſe I have added, in the following columns, a calculation of the number of cheſts in each aſſortment of ears, and the mean number of grains in each cheſt; alſo, the number of grains, and weight of a mean ear, of each aſſortment.

"The laſt table ſhews the total weight of the corn, chaff, and ſtraw, upon an acre, agreeable to this experiment, reckoning the crop at twenty buſhels of nine gallons, or ſeventy pounds, averdupoiſe, per buſhel.

"The very ſmall grains are not reckoned here, for the above reaſons; and that the waſte, in reaping, carrying, threſhing, and ſome left in the ſtraw, is more than they amount to. But by adding them, and allowing for about ſeven or eight inches long of ſtubble, the total weight of the crop may be nearly eſtimated.

A table of the length, weight, &c. of one thouſand two hundred and fifty ears, ſorted according to their length.

Ears. No.	Length. Inches	Cheſts. No.	Grains. G.	Sm.	do.	Wt. of Ears. Oz.	Dw.	Gr.	Wt. of Grain. Oz.	Dw.	Gr.	Wt. of Chaff. Oz.	Dw.	Gr.	Wt. of Straw. Oz.	Dw.	Gr.	Total Weight. Oz.	Dw.	Gr.
20	2¾ to 3¼	15 to 20	684			1	8	3	1	2	12	0	5	15	1	0	21	2	9	0
7	2¼ to 3¼	16	18	215	11	0	8	3	0	6	9	0	1	18						
11	2¾	15	16	300	11	0	11	21	0	9	5	0	2	16						
80	2¼	14	15	1930	60	3	13	10	2	17	13	0	15	21	7	11	16			
85	2	11	14	1600	110	2	18	18	2	5	6	0	13	12						
47	1¾	9	12	738	31	1	5	8	0	19	18	0	5	14				16	9	4
250				5467	223	10	5	15	8	0	15	2	5	0	8	12	13	18	18	4
8	3	17	18	265	4	0	10	12	0	8	8	0	2	4						
17	2¾	14	16	443	29	0	17	9	0	13	4	0	4	5						
108	2¼ 2½	14	15	2405	70	4	4	9	3	8	13	0	15	20						
164	2	11	14	2925	145	5	2	14	4	0	0	1	2	14						
203	1¾ 1½	9	11	2727	121	4	10	0	3	10	0	1	0	0						
500				8765	369	15	4	20	12	0	1	3	4	19	11	12	20	26	17	16
40	2¼ to 2½	13	16	827	50	1	10	12	1	3	13	0	7	0						
65	2	10	13	1075	70	1	15	15	1	7	14	0	8	0						
107	1½	8	10	1350	45	2	1	13	1	12	17	0	8	20						
38	1	6	7	293	5	0	8	19	0	6	19	0	2	0						
250				3545	170	5	16	11	4	10	15	1	5	20	5	11	9	11	7	20
250	¾ 3¼			1622	78	2	13	13	2	1	16	0	11	21	2	11	5	5	4	18
1250				19399	840	34	0	11	26	12	23	7	7	12	28	7	23	62	8	18

A comparative view of the above one thouſand two hundred and fifty ears of wheat.

	Ears. No.	Length. Inches	Grains. No.	Wt. of Grains. Oz.	Dw.	Gr.	Cheſts. No.	Grains per Cheſt.	Grains in a mean Ear.	Weight of a mean Ear.	
Largeſt	20	2¾ to 3¼	684	1	2	12	333	2.054	34.2	27.990	Grains.
Large	63	2¾ 3¼	1907	2	19	14	1012	1.884	30.269	22.696	Troy.
Smalleſt	288	0¾ 1¼	1914	2	8	10	2016	0.949	6.645	4.034	
Large	291	2¼ 3¼	7069	10	9	5	4318	1.675	24.292	17.288	
Medium	314	0 2	5600	7	12	20	3849	1.454	17.834	11.681	
Small	645	0¾ 1¾	6729	8	10	21	6199	1.085	10.432	6.358	
Total	1250	0¾ 3¼	19399	26	12	23	14366	1.35	15.519	10.232	

Total weight of the crop upon an acre, agreeable to the above ſpecimen, reckoning the ſame as twenty buſhels of nine gallons, or ſeventy pounds per buſhel.

Wheat.			Chaff.			Straw.			Total Produce.		
C.	q.	lb.	C.	q.	lb.	C.	q.	lb.	C.	q.	lb.
12	2	0	3	1	23	13	1	7	29	1	2

"Small experiments are not ſo ſatisfactory as large ones; and I could wiſh this had been more extenſive, but I had no thoughts of offering it to the public view till I read your correſpondent's letter, who has, I apprehend, gone upon a wrong rule in computing a crop, and has alſo choſen the mean ears too large: for though the ears of red Lammas wheat are uſually longer than the white, it cannot be ſuppoſed that, upon an average, they are above double, both in weight and number of grains, as we find thoſe were to the mean ears of this experiment. Neither is it at all probable, that the mean ears of the common crops in any part of England, and in the ſame year, ſhould be heavier, and contain more grains in them, than the very largeſt ears of this experiment.

"The ears of this wheat being from three and a quarter to three quarters of an inch in length, the medium is two inches. I have ranged all theſe together in the ſecond table. They are a fair medium in regard to length; and they are ſo alſo as to fullneſs, becauſe they are all included: but, as appears in the table, they are not ſo in reſpect to the weight of the grain, which is the rule for the medium of the crop; for the ſmall ears are more than double the number of the large ones, and yet the large ears are the heavieſt. If, in order to make the number of ears equal, we chooſe the mean ears ſhorter than two inches, the inequality of weight will be greater than before; and if we take our medium higher than two inches, the weight may be made equal, but this will increaſe the diſproportion in the number: and hence I think it is evident, that we cannot fix upon any ſize of ears that will give us a juſt medium of the crop. The ſame will happen in other crops, for they all vary one from another in the ſize and number of ears: and, as we cannot be certain of their real proportion as they ſtand in the field, it is impracticable to calculate a crop from thoſe of any ſize.

"The calculation of a crop from a mean ear is made by multiplying the weight of grain in that ear by the number of ears upon an acre. A mean ear of this experiment weighed as in the table, 10.232 grains troy, and the crop was about twenty buſhels upon an acre. Your correſpondent reckons the weight of the mean ear at 24.05 grains troy, upon an average of ſeven years; ſo that, reckoning the ſame number of ears upon an acre as in this experiment, his crops will amount annually to forty-ſeven buſhels per acre, of ſeventy pounds, averdupoiſe, per buſhel. Theſe are ſuch crops as I ſuppoſe, no conſiderable extent of contiguous lands in England produce annually; and are, doubtleſs, more than double the common crops upon an average.

"The diſproportion in the number of ſmall and large ears is very remarkable, and alſo their diſproportion in ſize: for, if we calculate from the twenty largeſt, we ſhall find that forty-three of them weighed as much as all the two hundred and eighty-eight ſmall ones, viz one large ear produced as much corn as ſeven ſmall ones, and the grain in them alſo larger, and conſequently more flour in them: for one hundred of the large corns weighed ſeventy-eight grains troy, and one hundred of the ſmall but ſixty grains; ſo that four grains of the large ears were heavier than five of the ſmall. This great difference is not from any defect in the rudiments of theſe ſmall ears, but is occaſioned principally from bad culture, and a defective nouriſhment; becauſe we ſee that the plants raiſed from the ſame ſeed will have larger or ſmaller ears, according as they are cultivated. It might, however, be uſeful to know at what period of their growth thoſe ſmall ears are ſtinted, and whether they are produced from the original plant, or from the tillers. I am not furniſhed with experiments to determine theſe points, but recommend them to the enquiry of your readers.

It is certain that the ears of wheat, in general, do not arrive to the ſize that they are naturally capable of: and if it was known at what period they are formed, the ſtinting of them might, in ſome degree, be prevented, by a dreſſing, or other culture, at that period. That there is ſome ſuch period in nature may appear from other circumſtances in the growth of this plant. There is a particular ſeaſon for its tillering, or ſpreading; another for its upright growth; and one for its bloſſoming and forming the ſeed; and probably one alſo for the ear being formed: and the growth of it, in reſpect to each of theſe, may be promoted by culture, or retarded by a defect of nouriſhment, at theſe periods.

"When the ſeaſon of tillering is paſt, no culture will make this plant throw out more branches; and after the ear is ſhot out, it is then impracticable to make it larger, viz. to encreaſe the number of cheſts. Again, when it has bloſſomed, no art will cauſe the ſtem to riſe higher. And, laſt of all, after the time of bloſſoming, there is no adding of one grain more than is already formed in the ear; though, in all theſe caſes, an addition, or improvement, may be made by culture, if applied at the proper time.

"It is therefore of importance to know the periods of growth of the different parts of the plant, and that if we happen to miſs aſſiſting of it in one, we may improve it in another. If the ſeaſon is loſt to increaſe the number of tillers, we may enlarge the ears: or if that is alſo omitted, we may encreaſe the number of grains in the ears, and make them larger and fuller of flour.

"To ſhew this more plainly, with reſpect to the grain, let us a little conſider the ſtructure of an ear of wheat. The grain is placed in a cell, conſiſting of two valves, or leaves; and there is one leaf extraordinary on each outſide of the cheſts, which ſeems intended as a fence, or ſecurity againſt accidents to the outward grains. The cheſts about the middle of the ear are the largeſt, and uſually conſiſt of four, five, and ſometimes ſix or ſeven cells: and the number of cells decreaſes towards the top and bottom of the ear. If the ear is examined when in bloſſom, we may ſee what number of grains each cheſt is formed to produce: or this may be ſeen afterwards by the number of double valves, which are properly the chaff, for theſe remain though the grains have proved abortive, and therefore by counting the leaves of chaff, allowing

two

two to each grain, and two extraordinary to each cheſt, we ſhall find what number of grains each cheſt might have produced.

"The outward grains of the cheſts are commonly the largeſt, and ſmaller towards the middle, and often ſtinted grains, or none at all, in the middle cells; and this notwithſtanding moſt of theſe had bloſſoms in them, and the grains had made ſome progreſs, or begun forming. They are later than the outſide grains, as if laſt impregnated.

"The number of theſe deficient, or miſſing grains, is greater than might be ſuppoſed without examining them. In a favourable ſeaſon moſt of the cells have grains in them; and, if examined at the time of bloſſoming, the grains may be ſeen in different degrees of maturity, many of them, with the naked eye, and others with a good glaſs; but though they appear then in general to be freſh, and in a growing ſtate, a conſiderable number of them is afterwards ſtinted, or die away entirely. In an ear of red Lammas wheat, of ſix inches long, twenty-five cheſts, and two hundred and eighty-ſix leaves of chaff, I have counted ſeventy-four grains ſome time after bloſſoming; by which it appears, that this ear might have produced one hundred and eighteen grains; and yet at harveſt I have not commonly found above ſixty grains in an ear of that length. I have likewiſe this ſeaſon counted fifty-four grains in an ear of white Lammas wheat, of three inches and a quarter long, nineteen cheſts, and one hundred and ſeventy-four leaves of chaff; ſo that this ear might have yielded ſixty-eight grains: but we ſee in the above tables that the fulleſt ear, of the ſame ſort of wheat, and the ſame length, yielded only forty-one grains; and three of the ſame length, yielded but thirty-eight grains and one third each, upon an average.

"The tillage and dreſſing of land for wheat is done for the moſt part, before the wheat is ſown, and the benefit of theſe gradually decreaſe; whereas the wheat requires a gradual encreaſe of nouriſhment, both in order to form large ears, and afterwards to fill them with large grain. And hence appears the great defect of the common huſbandry, and points out the advantages of top-dreſſing wheat in the ſpring with ſoot, or other light manure, which brings the plants a freſh ſupply of nouriſhment when they want it moſt; and hoeing, when it can be performed at the proper times, particularly the deep, or horſe-hoeing, has the ſame effect of producing large ears; and for filling them, the horſe-hoeing is the moſt effectual, as that can be performed at the critical time, and when the plants are large.

"It has been commonly ſuppoſed, by thoſe who practiſe the New Huſbandry, that the moſt important hoeing, for the purpoſe of filling the ears with good grain, is ſoon after the wheat has bloſſomed: but this, I believe, is a miſtake, and that it ſhould be performed immediately before the wheat blows; for before that is over, the grain is conſiderably advanced. I have found no leſs than ſeventy-ſeven grains in an ear of red Lammas wheat, of four inches and three quarters long, and at the ſame time a conſiderable part of the bloſſoms ſtill remaining on the outſide of the ear.

"This is above one third more than uſually comes to maturity in an ear of that length; ſo that it ſeems very probable the ears would produce near one third more corn than they commonly do, were they to be aſſiſted at that time with ſufficient nouriſhment. But this would come too late after the bloſſoming is over; for by that time, ſome of the weak grains die, and others are ſtinted, ſo as not to be recovered again by any future hoeings. A check at this critical time ſeems to have the ſame effect as it has upon a grain of corn, or other ſeed, after it has begun to vegetate: if that is put a ſtop to, it never recovers.

"From the great number of ſmall ears in a crop, and the deficient grains in all the ears, we may plainly ſee the advantage of good culture, and of taking the proper ſeaſons to apply it. The New Huſbandry is, in this reſpect much to be preferred; and alſo becauſe much fewer plants will produce an equal crop; in which there are ſeveral advantages, beſides ſaving above half the ſeed. This method of culture, is, indeed, ſo much ſuperior to the common huſbandry, not only in raiſing wheat, but plants of almoſt every kind, that it is to be wiſhed it was more promoted.

"I am ſenſible that ſeveral gentlemen have objections to this huſbandry, ariſing partly from a miſinformation of Mr. Tull's practice and ſucceſs, and partly from the difficulty they apprehend in overcoming the prejudices of the farmers to any new methods.

"That they are very tenacious of old cuſtoms, is readily admitted, nor are they to be too much blamed on that account: but that they cannot be prevailed with to alter them, upon rational evidence, and proper encouragement, is, it is apprehended, carrying the argument too far, as this tends to diſcourage all attempts of improvement.

One of the reaſons aſſigned, why the farmers cannot be brought to practiſe the New Huſbandry, is the difficulty of managing a drill-plough for ſowing corn, which is admitted, though that is not ſo great as ſome have ſuppoſed; for I have ſeen a huſbandman learn to manage ſuch an inſtrument, who, after one day's practice, could ſow with it four or five acres a day, with the proper quantity of ſeed, at a leſs expence than common ſowing and harrowing.

"Some have objected farther, that the farmers cannot practiſe this huſbandry, becauſe they are ignorant of its principles: but theſe principles are not many, nor hard to be underſtood, ſo far, at leaſt, as relates to practice; and in fact, the practice of the New Huſbandry is eaſier than the old, becauſe it is founded upon clear principles, which often is not the caſe in the old huſbandry.

"It ſeems that ſeveral gentlemen are not for introducing this new method, becauſe they are not convinced that it is, upon the whole, better than the old. If we may credit thoſe who have gone furtheſt in the practice of the New Huſbandry, thoſe gentlemen abroad in particular, who have publiſhed their experiments, there ſeems to be no doubt of its ſuperiority: but as it is a matter of great importance, that this fact ſhould be fully eſtabliſhed to the ſatisfaction of all gentlemen, from whoſe influence and example the moſt valuable improvements are to be expected, the trial is not difficult, nor very expenſive: a ſmall farm, with ſome variety of ſoils in it, cultivated in the ſeveral methods, by way of compariſon, and exact accounts kept of the expence and produce of each, would determine this point without any reaſonable doubt.

"In matters of this ſort, ſpeculations and reaſonings are not to be relied on without experiments; and the larger thay are, they will be the more convincing. Whether ſomething, like what is here propoſed, might not have the

desired effect, and likewise be a means of making useful discoveries in vegetation, and the culture of plants, is submitted to the consideration of those who have at heart the improvement of agriculture.

"A more extensive plan is necessary for introducing new methods into common practice, and which might comprehend the farmers, and also the husbandmen, who execute and excel in the performance. It is recommended to your readers to consider and propose what they think the most probable means for attaining these desirable ends." *Museum Rusticum, vol.* III. *p.* 38.

"It is certain, says another ingenious husbandman, that many strange reports were raised of Mr. Tull, and his husbandry, by prejudiced persons; and his book being printed for the author, some booksellers were much offended, and employed several hands to write against him, which they did in a most scurrilous manner, asserting many things that were false, and misrepresenting others. Some of these he takes notice of himself, in the additional parts of his work. I shall mention only one instance how ready people were to give credit to such false reports. "Last summer," says he, "the vulgar in general believed, in a country but twelve miles distant from me, that I always carried my dung and threw it into a river: now there is no river nearer to the barton where my dung is made, than is the fartheſt part of my land; so that the expence of losing my dung would be greater than spreading it on any part of my farm. Besides, I live in a country where farmers buy dung at a good price; but it is known that I neither sell nor waste any dung. Against such lying tongues there is no defence."

"But a principal cause, that the reports of his bad success in his wheat crops have gained so much credit, I believe, is, that the additions to his Essay are out of print, and not generally known; and it is chiefly with a view to inform your readers of them that I write this letter.

"Mr. Tull began his scheme of successive wheat crops with four rows. Afterwards he found that three rows were better, and was in that practice, of drilling three rows upon a ridge, when he published his Essay. Upon further experience he found, that two rows produced as good crops as three or four, and were more easily managed. This he recommends as his last and best method; and altered his drill-plough to his practice of planting only two rows upon a ridge, of which he gives a cut and description in his Addenda and Conclusion. By this alteration, his drill is much less complicated, and less difficult to manage, than that for planting three rows, described in his Essay.

"The gentlemen abroad, who are now promoting the New Husbandry, have gone into the practice of planting three rows upon every ridge, supposing that to be the best method; and the drill-ploughs invented by M. Duhamel, and M. de Chateauvieux, are constructed to sow three rows.

"From the practice of the gentlemen abroad, and other instances that might be given at home, it is evident, that they have not seen the additions that Mr. Tull made to his Essay, in which, besides his different method of drilling, there are several very material improvements in the manner of hoeing and cultivating wheat, and other crops; and from these last parts of his work may be also seen, that the reports of his bad success, in repeated wheat crops, are without any just foundation.

"In order to shew this more clearly, it may be proper to premise a short chronology of the progress of his husbandry, collected from his own account of it; in which it is to be observed, that as the year, at that time, was by some reckoned to commence the first of January, and by others the twenty-fifth of March, and the crops at other periods, it occasions an uncertainty of sometimes a year in this account.

Mr. Tull began his horse-hoeing husbandry about the year — — 1723
his successive horse-hoed wheat crops 1726

He published his Specimen — — — 1731
his Essay — — — 1733
his Supplement to the Essay — 1735
his Addenda — — 1737 or 1738
His Conclusion is dated March 31, — 1739
(All these are printed in small folio)
He died about the year 1741.

"As to his practice of raising successive crops of wheat, he made the experiment first upon part of a field, which had not been dunged for some time, and upon this part he continued to raise wheat for twelve years, without the assistance of any manure. In the preface to his Essay, he says, "The particular scheme of raising annual crops of wheat, without dung or fallow, is as yet only upon probation; but by the six crops I have had in that manner, I see nothing against their being continued." In the Supplement, page 249, he tells us, "There is now the eleventh crop of wheat on the same field, (except that in the ninth year, by accident, of having contracted to let my farm, it was drilled with white oats) and I do not yet see any reason against its being continued for wheat annually, as long as it is kept in this culture." In the Addenda, page 261, "The field which last year had the eleventh crop of wheat," (as in page 249) "has now the twelfth on it, very likely to be a good one." And in the conclusion, he says, that the twelfth crop of wheat, upon this field, "was the best, I believe, that ever grew on it." "It is now the thirteenth crop, likely to be very good, though the land was not ploughed crossways;" which he mentions it was the year before, in order to alter the size of the ridges.

"I have here collected what he says of this field in particular, as it was his field of experiment, upon which he had raised the most crops of wheat, without any manure. Let us next see what crops he had upon his lands in general.

"He begins his Addenda with acquainting the reader, that he was desired to take an exact account of the crop of an acre of horse-hoed wheat, part of a field of twenty-five acres, in order to see the difference between that and the crop of a small piece of ground, drilled upon the level, and hand-hoed. This acre being measured, and the crop reaped, and threshed by itself, yielded twenty-nine bushels and three pecks of clean wheat, nine gallon measure. But he observes that great waste was made by the reapers of this acre; and some damage was done to the corn by cattle; for which allowance being made, he reckons the real produce of this acre to have been thirty-two bushels, or four quarters of wheat.

"He then proceeds to give an account of the crops of wheat

wheat upon his other fields, which, including the above-mentioned field, were in all one hundred and ſix acres. The corn was not threſhed when he wrote this; but it appears, by his account of the crop, as I have computed it, that theſe one hundred and ſix acres produced, upon an average, nearly twenty buſhels of wheat per acre.

"If the quality of this land is conſidered, none of it rich, and the greater part light, and of a thin ſtaple, this cannot be called a bad crop. But there was another very important circumſtance, which ought to be conſidered: Mr. Tull was now advanced in years, and in a very bad ſtate of health: was frequently confined to his room, and ſometimes to his bed; inſomuch that, as he tells us, he had not ſeen ſome of his crops from the time they were ſown till the ſpring following. And in his Supplement he ſays, page 225, "My agriculture having been carried on by common day-labourers, without any body to inſpect them, (except when my diſeaſes ſuffered me to attend them, which, for ſeveral years laſt paſt, has been very ſeldom) cannot be expected to be all well managed; for though they can do it well when they pleaſe, yet their will being above controul, I muſt be content with their doing ſome tolerably well every year."

The duſt of the maſter's feet is a kind of manure ſo neceſſary in every ſcheme of huſbandry, that no perſon of experience in ſuch matters, who reflects upon theſe circumſtances, would have reaſon to be much ſurpriſed, if Mr. Tull's crops had really failed as much as has been ſuppoſed; and if we alſo take into the account, that theſe day-labourers whom he employed, and who had the management of his agriculture at the critical ſeaſons, were then generally, as ſuch men ſtill are, prejudiced againſt the new huſbandry, I think his ſucceſs, notwithſtanding theſe diſadvantages, is a ſtrong argument in favour of this huſbandry.

"But let us proceed to what Mr. Tull ſays further of theſe ſucceſſive wheat crops. In the Addenda, page 263, he tells us, "I have now ſix ſcore acres of wheat, an hundred acres of which are on the ſtubble of the laſt years wheat crop.

And in the concluſion, p. 273, "The crop of the ſix ſcore acres of wheat, that was growing at the time of publiſhing my Addenda, was much greater than the crop the year before it, and would have produced more grain in proportion, if the heavens had been as propitious; but the heavy rains that fell when the firſt planted was moſt in bloſſom, diminiſhed the filling of the ear and its grain, yet not ſo much as of moſt ſown wheat, eſpecially of the early-ſown, which generally eſcapes the beſt in this common calamity. The burn-baked wheat, being always early ſown, I am informed had next to no grain in it; and this is the moſt expenſive ſort of huſbandry, the tenants pay ſuch exorbitant fines for the liberty of ploughing this land."

Again, page 274, "The ſame ſix ſcore acres that was wheat the laſt year, is planted with wheat now, and is all of it as ſtrong and likely for a good crop as in any of the former years, though there is but about one acre of it dunged. The whole is the freeſt from weeds before hoeing that ever, was ſeen, and the ſown wheat in the neighbourhood the fulleſt of them."

"I can ſhew, at this inſtant, one of the experiments I have recommended, which, though it be on leſs than two perch of ground, muſt convince every man who ſees it (and doth not renounce the evidence of his reaſon and ſenſes) that pulverization by inſtruments can vaſtly exceed the benefit of common manure.

"It is to ſuch experiments that I leave the progreſs of my horſe-hoeing huſbandry, aſſuring the public, that in all my practice, which is now thirteen years, I never have met with one inſtance that gives me the leaſt ſuſpicion of the truth of the principles I have advanced; and that, I believe, they have nothing to fear from enemies, but the falſe relation of facts, or fallacious arguments."

"Mr. Tull mentions here, that he intended this to be his laſt crop. He lived about two years afterwards. Whether he continued to occupy his farm, I am not certain; but if he did, and his crops were worſe than the preceding years, that could not be juſtly attributed to any error in the principles, but to the other cauſes above mentioned. We ſee here that he appeals to an experience of thirteen years: nor can it be ſuppoſed, or admitted, that a perſon of Mr. Tull's underſtanding would go on from year to year to enlarge his plantations of wheat to the extent of one hundred and twenty acres, had he not been fully ſenſible of the advantage of ſo doing.

"The repetition of wheat crops upon the ſame land may, by many perſons, be ſuppoſed rather a matter of curioſity than of any great uſe; a change of crops being the general cuſtom, and ſuppoſed to be the moſt profitable; but this is not ſo clear as ſome imagine. The cuſtom is founded upon the ſuppoſition that change of crops is neceſſary; which, though it may be true in the old huſbandry, is not ſo in the new: and, without doubt, the change is often hurtful to the farmer; for, not to inſiſt on the extraordinary labour neceſſary to prepare the land, and the loſs of the ſeaſon, if it cannot be got into proper order in time, or, which is as bad, ſowing it, though not in proper tilth to receive the ſeed, the main point of all is, whether the profit of theſe ſeveral different crops is really more than hoed ſucceſſive crops of wheat, or other corn commonly propagated? In anſwer to this, I believe it is not very difficult to ſhew, by a fair compariſon of both, that the hoed crops are the moſt profitable, even including the clover and turnips in the old huſbandry. Nor is a profitable change of the crop, or the advantage of obtaining ſometimes three crops in two years, peculiar to the old huſbandry; for the ſame may be had to greater advantage in the way of hoeing.

"There is another circumſtance in the old huſbandry, very unfavourable to the farmer. As he is under a neceſſity of changing his crops, he cannot adapt them to the ſoil. Moſt farms have land in them of very different qualities, and theſe are not equally proper for the production of plants of every kind. The ſtrong land, that is very fit for beans, wheat, and clover, is not equally ſo for peas, barley, and turnips. But the farmers commonly vary their crops according to the cuſtom of the country, and the conſequence is, that moſt of their lands are planted in their turn with crops not the moſt ſuitable to them; which is an inconveniency that may be avoided in the New Huſbandry.

"Having pointed out the additional parts of Mr. Tull's work, it is hoped that we ſhall ſoon have a new impreſſion; but as it may poſſibly be ſome time before the laſt parts of his work are re-publiſhed, I ſhall, for the benefit

of ſuch of your readers as incline to practice the New Huſbandry, take notice of one or two important alterations in the horſe-hoeing culture.

"In the Eſſay, Mr. Tull directs, that the hoe-plough ſhould be brought as near as poſſible to the rows at firſt, and when the plants are young; but that the ſubſequent hoeings ſhould be at ſome diſtance from the rows, leſt the plough ſhould tear off too many of the roots, and deſtroy the plants; alſo that the laſt hoeing ſhould throw the earth of the intervals up to the plants which he thought neceſſary for their better nouriſhment, when they were grown large. His laſt practice was different in both theſe reſpects.

"For in the concluſion, page 272, he ſays, "At the ſecond hoeing, the plough goes in the furrow of the firſt, making it deeper and nearer to the wheat: the third hoeing fills up this furrow; and then, at the fourth hoeing, the plough goes in the ſame place as the ſecond, turning the mould into the intervals. It is remarkable, that though the furrows of the ſecond and fourth hoeings be deep and near to the rows, ſeeming to deprive the wheat of the mould which ſhould nouriſh it, whereby one would imagine, that theſe furrows, lying long open, ſhould weaken or ſtarve it; but it is juſt the contrary, for it grows the more vigorous: and it is the obſervation of my ploughmen, that they cannot, at theſe hoeings, go too near to the rows, unleſs the plough ſhould tear out the plants.

"If I may preſume to aſſign the cauſe of this ſurpriſing effect, it is, in my opinion the following, viz. this open furrow has a double ſurface of earth, which, by the nitre of the contiguous atmoſphere, is pulveriſed to a great degree of minuteneſs near the row. The roots that the plough cuts off on the perpendicular ſide of the furrow, ſend out new fibres to receive the pabulum from this new-made paſture; and alſo part of this ſuperfine powder is continually falling down into the bottom of the furrow, and there gives a very quick growth to thoſe roots that are next it, and a quick paſſage through it into the earth of the interval, where they take likewiſe the benefit of the other ſide of this pulverized furrow. When it is ſaid that air kills roots, it muſt not be underſtood that it kills a plant, unleſs all, or almoſt all, its root is expoſed to it, as it is not in this caſe. Some think there are roots that run horizontally below the plough into the interval; but of this I am not convinced.

"It is not often that we plough above four times, and then the furrow is turned towards the row at the third time only.

"Whether theſe furrows lying long open next the rows, in very hot dry climates, may be prejudicial, cannot be known but by trials.

"The practical hoer will find this method of going cloſe to the rows of wheat, and other plants of great ſervice to him; not only in the vigour of his plants, but alſo in the more perfect tillage of his land, and a conſiderable ſaving in hand-hoeing, weeding, and manure.

"The other circumſtance, of a large plant growing more vigorous, and the ſeed filling better, by ploughing the earth away from one ſide of it, is ſo ſingular, and oppoſite to the common practice of gardeners, that ſhould it ſucceed generally, it may lead to ſomething new in the theory of vegetation." *Muſeum Ruſticum, vol.* III. *p.* 159.

A comparative calculation of expence and profit between the drill and the common huſbandry, taken from Mr. Baker's report to the Dublin ſociety of his experiments in agriculture, for the year 1765. *Publiſhed by order of the ſociety.*

An eſtimate of the expence upon a plantation acre of wheat, in the common huſbandry.

	l.	*s.*	*d.*
To the firſt ploughing, commonly called breaking, for fallow, eight horſes eight ſhillings; two ploughmen one ſhilling and four-pence; two drivers one ſhilling — —	0	10	4
To the firſt harrowing, four horſes four ſhillings; a driver ſix-pence — — —	0	4	6
To the ſecond ploughing, commonly called gaurowing — — — —	0	10	4
To the ſecond harrowing — —	0	4	6
To the third ploughing, commonly called ſtretching — — —	0	10	4
To ſowing the ſeed, eight horſes eight ſhillings; two plowmen one ſhilling and four-pence; two drivers one ſhilling; the ſeed-man eight-pence — — — —	0	11	0
To ſeed wheat one barrel — —	1	0	0
To rent for the year of fallow — —	0	18	0
To ditto, the year the crop is growing —	0	18	0
	5	7	0

In this account forty ſhillings are charged for forty horſes, employed in the culture of one acre of wheat, in the common huſbandry; a charge which ought to be conſidered by the farmer, for he actually buys and maintains his horſes for this buſineſs.

The crop which follows wheat is generally oats; but ſometimes peas are ſown inſtead of oats; with ſome, the practice is to let the peas follow oats, in which caſe they fallow only every fourth year; but where land receives no other aſſiſtance than what ariſes from fallow, it is a bad practice not to fallow every third year. It is the general practice to plow but once for oats, and therefore it ſhall be ſtated ſo; but it is a much better practice to plow the wheat ſtubble once before winter, and again in the ſpring.

An eſtimate of expence upon an acre of oats.

	l.	*s.*	*d.*
To plowing once — —	0	10	4
To ſeed oats, two barrels — —	0	12	0
To harrowing 4*s.* 6*d.* ſeed-man 4*d.* —	0	4	10
To one year's rent — — —	0	18	0
	2	5	2

Theſe two crops conſume three years; after which the farmer is to begin again, and to incur every article of expence ſtated in the above accounts, in order to obtain two crops more.

An

An eſtimate of expence upon a plantation acre of wheat in the drill huſbandry, the firſt year.

	l.	*s.*	*d.*
To plowing 4 times, to prepare the fallow —	2	1	4
[This is the ſame charge as in preparing for the common huſbandry.]			
To harrowing twice for ditto ——	0	9	0
[This is the ſame alſo.]			
To rent for the year of fallow ——	0	18	0
[This charge is ſaved after the firſt year.]			
To harrowing with the drill harrows ——	0	0	6½
[Four acres a day may be harrowed with one horſe.]			
To ſowing with the drill plough ——	0	1	1
[From 3 to 5 acres may be ſown in a day.]			
To ſeed-wheat, generally 5 ſtone, but ſuppoſe 6 —— ——	0	6	0
To the firſt or winter hoeing ——	0	1	7
[Two acres may be hoed in a day, two horſes, plowman and driver: the deſign of this hoeing is to leave the plants dry and to meliorate the earth.]			
To the ſpring hoeing with the cultivator —	0	1	1
[To deepen the ſoil, one horſe, ploughman and driver.]			
To the third hoeing, *i. e.* to return the meliorated earth to the corn ——	0	1	7
[To make the corn tiller, *i. e.* to encreaſe its branches.]			
To the fourth and final hoeing ——	0	1	1
[To fill the grain and render it large.]			
To rent the year the corn is growing —	0	18	0
	4	19	3½

N. B. Although the drill culture for the firſt year is very near as expenſive as the common, yet, after taking the firſt crop, the expence and labour of fallow, and loſs of time is not to be incurred again, as is unavoidable in the common huſbandry.

An eſtimate of expence upon an acre of drilled wheat, after the firſt crop.

	l.	*s.*	*d.*
To ploughing the land once ——	0	10	4
[One ploughing is all that is neceſſary.]			
To harrowing with the drill harrow ——	0	0	6½
To ſowing with the drill plough ——	0	1	1
To ſeed-wheat —— ——	0	6	0
[Be it remembered, 5 ſtone is enough.]			
	0	17	11½
To four times horſe-hoeing, as before ſtated -	0	5	4
To one year's rent —— ——	0	18	0
	2	1	3½

Thus the land is ſown again with wheat every year, and inſtead of 4*l.* 9*s.* which is the farmer's expence in the common huſbandry, excluſive of one year's rent of the land: in the drill method it is no more than 17*s.* 11½*d.* and the total expence, inſtead of 5*l.* 7*s.* is no more than 2*l.* 1*s.* 5½*d.* rent included; whereby there is a ſaving of 3*l.* 5*s.* 8½*d.* an acre.

Before the account of profit and loſs upon theſe different methods of culture be ſtated, it will be neceſſary to take notice of an objection, which may perhaps be made to the above charge of plowing in the common huſbandry. It is pretended, that three quarters of an acre may be plowed in a day, with one plow: but can it be done effectually? The land may, indeed, be ſcratched, but cannot really be plowed as it ought to be. The farmer ought to be cautioned againſt a trick too frequently practiſed in plowing. When a ploughman enters his plow, and paſſes acroſs the field he turns a ſod about a foot broad: when he is to return, he enters his plow about four feet diſtance from the outſide of the former furrow, and ſo turns another ſod of the ſame breadth, which, when turned, juſt meets the former ſod; thus four feet of the land appear to be plowed, whereas the fact is, that the two feet lying under the ſods is not touched with the plow at all. This deception, added to the practice of juſt ſkimming the ground, enables hirelings to undertake plowing at 6 and 7*s.* an acre. But if a plantation acre of land be well and effectually plowed, 10*s.* 4*d.* as charged above, will not appear too much; and it is, in fact, ſupported by the common courſe of buſineſs. When wheat is to be ſown, it is the general cuſtom to ſend a barrel of ſeed into the field with two plows, which is to ſow an acre of land, and that is the uſual day's work for two ploughs in the general courſe of buſineſs. Let us ſee then, what the expence will amount to. Eight cattle will be 8*s.* two plowmen 1*s.* 4*d.* two drivers 1*s.* and the ſeedſman 8*d.* which in all makes 11*s.* and correſponds with the above charge.

Dr. One acre of wheat and oats in the common huſbandry, for fifteen years. *Per Contra*, Cr.

		l.	*s.*	*d.*		*l.*	*s.*	*d.*
To the expence on a wheat crop,	2d year -	5	7	0	By the produce of wheat, 9 barrels, at 20*s.*	9	0	0
To the expence on an oat crop,	3d year -	2	5	2	By the produce of oats, 14 —— at 6*s.*	4	4	0
To the expence on a wheat crop,	5th year -	5	7	0	By the produce of wheat, 9 —— at 20*s.*	9	0	0
To the expence on an oat crop,	6th year -	2	5	2	By the produce of oats, 14 —— at 6*s.*	4	4	0
To the expence on a wheat crop,	8th year -	5	7	0	By the produce of wheat, 9 —— at 20*s*	9	0	0
To the expence on an oat crop,	9th year -	2	5	2	By the produce of oats, 14 —— at 6*s*	4	4	0
To the expence on a wheat crop,	11th year -	5	7	0	By the produce of wheat, 9 —— at 20*s.*	9	0	0
To the expence on an oat crop,	12th year -	2	5	2	By the produce of oats, 14 —— at 6*s.*	4	4	0
To the expence on a wheat crop,	14th year -	5	7	0	By the produce of wheat, 9 —— at 20*s.*	9	0	0
To the expence on an oat crop,	15th year -	2	5	2	By the produce of oats, 14 —— at 6*s.*	4	4	0
		38	0	10				
To clear profit in 15 year ——		27	19	2				
		66	0	0		66	0	0

Dr.

Dr. One acre of drilled wheat, for fifteen years. *Per Contra*, Cr.

		l.	s.	d.		l.	s.	d.
To the first and	2d year's expence -	4	19	3½	By the produce of wheat, 2d year, 6 barrels,	6	0	0
To the ———	3d year's expence -	2	1	3½	By the produce of ditto, 3d year, 6 ———	6	0	0
To the ———	4th year's expence -	2	1	3½	By the produce of ditto, 4th year, 6 ———	6	0	0
To the ———	5th year's expence -	2	1	3½	By the produce of ditto, 5th year, 6 ———	6	0	0
To the ———	6th year's expence -	2	1	3½	By the produce of ditto, 6th year, 6 ———	6	0	0
To the ———	7th year's expence -	2	1	3½	By the produce of ditto, 7th year, 6 ———	6	0	0
To the ———	8th year's expence -	2	1	3½	By the produce of ditto, 8th year, 6 ———	6	0	0
To the ———	9th year's expence -	2	1	3½	By the produce of ditto, 9th year, 6 ———	6	0	0
To the ———	10th year's expence -	2	1	3½	By the produce of ditto, 10th year, 6 ———	6	0	0
To the ———	11th year's expence -	2	1	3½	By the produce of ditto, 11th year, 6 ———	6	0	0
To the ———	12th year's expence -	2	1	3½	By the produce of ditto, 12th year, 6 ———	6	0	0
To the ———	13th year's expence -	2	1	3½	By the produce of ditto, 13th year, 6 ———	6	0	0
To the ———	14th year's expence -	2	1	3½	By the produce of ditto, 14th year, 6 ———	6	0	0
To the ———	15th year's expence -	2	1	3½	By the produce of ditto, 15th year, 6 ———	6	0	0
		31	16	1				
To clear profit in fifteen years ———		52	3	11				
		84	0	0		84	0	0

	l.	s.	d.
To clear profit arising upon an acre of land in fifteen years in the common husbandry -	52	3	11
To clear profit arising upon an acre of land in fifteen years in the common husbandry -	27	19	2
Greater profit on the drilled acre, in fifteen years ——— ———	24	4	9

Which amounts to 1 *l.* 12 *s.* 3¾*d. per annum.* for fifteen years on the acre, more than by the common husbandry.

In the drill husbandry the crops are stated at three barrels of wheat less upon an acre than in the common husbandry, that it may not be supposed to be over-rated; but in the common husbandry, the crops are rated at the highest; fourteen barrels of oats an acre, are also allowed in the common husbandry, which every farmer must admit to be a great allowance upon the general produce.

That the drill culture will produce six barrels an acre, is fully proved in Mr. Baker's report at large, which will be shortly published, where it will be shewn, that much more has been produced.

Doubtless it will be observed, that in fifteen years fourteen wheat crops are obtained in the drill husbandry; in the common husbandry only five wheat and five oat crops: the five other years are not only lost, but are an heavy expence to the farmer.

A farmer having forty acres of tillage, supposing him to direct his attention to bringing it to the drill culture, would make in fifteen years 969 *l.* 10 *s.* more than he can in the common husbandry; which is such an advantage, that the greater profit in the drilled acre in fifteen years will purchase the fee simple of that in the common husbandry, at twenty-seven years purchase, valuing the land at 18 *s.* an acre.

Thus it appears, that in every fifteen years the fee-simple of all the tillage lands of the kingdom, is lost to the community by the common course of tillage.

In stating these accounts, no mention is made of fences, water, cutting the land, weeding and reaping, as these articles of expence depend on a variety of circumstances, but, in general, will be more on the common husbandry than on the drill.

Mr. Baker began the horse hoeing culture of wheat before he was fully master of the practice, as appeared by the event: for his crops, during the three years that he practised this culture, declined every year, and for that reason he gave it up as unprofitable; which, without doubt, discouraged many from engaging in it, particularly in Ireland. His ill success was not, however, from any error in the principles, which is evident from Mr. Tull's own success, and of others since, who have practised this husbandry on wheat, much longer than he did; and it appears from the account given by Mr. Baker, that he deviated from the methods necessary in this cultivation of wheat.

1. In the horse hoeings from the wheat, his hoe plough was not brought so near the rows as Mr. Tull directs, and as he himself and others since have practised.

2. He gave his wheat but four horse-hoeings, which were not enough; for though Mr. Tull, when he became perfect in this culture, gave commonly but four hoeings, Mr. Baker's land required more to keep it in that state of tilth and pulverization that is necessary in such strong, stiff, churlish land, as Mr. Baker describes his to be.

3. Two of Mr. Baker's four hoeings, were performed with M. de Chateauvieux's cultivators, which have no earth board, and do not turn the furrows; which the hoe plough does, and is necessary in hoeing wheat. By turning the furrows frequently, a new surface of earth is every time exposed to the action of the atmosphere: and to this we must ascribe the encreased fertility of the land, whereby it is enabled to nourish the crops of wheat repeated every year; for it has no manure, nor any assistance but from tillage: if that is abridged, and it has not due exposure, the crops must decline, as Mr. Baker's did, partly from this defect in the manner of hoeing.

4. In horse-hoeing wheat, if the crops are found to decline, there are two remedies directed by Mr. Tull, and practised by skilful cultivators, viz. to give the land more hoeings in the proper season, which encreases its fertility; or to sprinkle a little soot, malt dust, coal-ashes, or

or other fine manure, upon the rows of wheat in the ſpring, about the beginning of February; one or both of theſe will, without doubt, reſtore the land, and improve the crop. Had Mr. Baker done ſo, when he perceived his crops were declining, he might have gone on with ſucceſs, as ſome others have done from eight or ten, to near thirty years.

Though we, happily, in this kingdom, are not under the ſame neceſſity as ſome foreign countries, of building large edifices for public granaries, becauſe our harveſts are much leſs apt to fail us; yet as this work is perhaps too preſumptuouſly, intended for general uſe, it is incumbent on me to ſpeak of thoſe effectual, though expenſive means, of guarding againſt dearth or even famine, as well as of the cheaper and eaſier methods, by which every farmer may be enabled to enjoy the advantage of preſerving a large quantity of corn in a ſmall ſpace, without danger of its heating and fermenting, of its being preyed upon by deſtructive animals and infects, or of its being ſpoiled through the ignorance or want of judgment, of inattentive ſervants.

Corn reaped in a dry year, and eſpecially that of the growth of a hot country, is well known to be the moſt perfect, and the fitteſt for keeping; as, on the contrary, experience has proved that the ſofter and leſs ripened grains of wet years and rainy harveſts ſhould always be diſpoſed of for more immediate uſe, though their too great humidity, which would infallibly occaſion a putrefaction, if not remedied in time, may be exhaled, and they may then be preſerved a long while in very good condition, as will be ſhewn from repeated facts and proper experiments.

The antient Romans imported annually vaſt quantities of corn from Egypt, a very hot and dry country, ſcarcely ever watered but by the periodical overflowings of the fruitful Nile; and they found this grain anſwer much better than any of their own growth, both for yielding plentiful crops, when ſown in Italy, and for keeping in their public granaries, where they frequently preſerved it many years perfectly ſound. Pliny tells us, that, in his time, they kept corn a long while in ſubterranean caverns, made in a dry ſoil, and ſo cloſely ſtopped that not a breath of air could enter. They then covered the bottom with ſtraw, and laid upon that the corn in the ear. We have the concurrent teſtimony both of the ancients and moderns, that it will keep thus perfectly well for at leaſt ſix or ſeven years; and an accident, not long ago, diſcovered a parcel of corn thus preſerved at Amiens, where, though it had been laid up during a great number of years, it was found to be freſh and good, neither worm-eaten, rotten, nor mouldy. This was certainly owing to the moiſt air having been kept out, and with it the eggs of animals, and ſeeds of thoſe minute vegetables which we ſee in form of mouldineſs on ſuch corn as has been leſs carefully defended from their acceſs. In effect, experimental philoſophy has proved that the air is the great ſource of corruption; for even the moſt corruptible ſubſtance, ſuch as meal, butter, milk, and the like, have been preſerved freſh four months in the exhauſted receiver of an air pump.

There ſtill is, near grand Cairo, a vaſt ſubterranean magazine of corn, defended with good walls, and called Joſeph's granaries. It is hardly to be ſuppoſed that they are quite ſo old as the days of that patriarch: but they abundantly prove the utility of ſuch places of ſtore, by the vaſt quantities of grain annually preſerved in them.

Many parts of Africa, the corn of which country, and particularly that about Algiers and Tunis, will keep much longer than the growth of any other place, abound with granaries of this kind. They are deep pits made in the ſolid rock, but juſt wide enough at their top for a man to go down into them, but they grow larger immediately after, and are uſually ſquares of from thirty to forty feet in diameter. In theſe the great men of the country preſerve their corn. They firſt cover the floor with ſtraw, then ſpread upon that a layer of corn, upon this another, but thin, bed of ſtraw, then another couch of corn, and ſo on, till the whole cavity is filled; obſerving all the while, as the heap riſes, to place ſtraw between the corn, and the ſides of the walls. When this is finiſhed, they cover the mouth of the entrance with a ſort of hurdle, over which they lay about two feet thick of ſand, and over this they raiſe a ridge of earth well beaten together, in order to throw off the rain both ways, that none may ſettle on the place and ſoak into the magazine. The corn thus ſtored up always keeps three, four, or more years very ſound; and not unfrequently the proprietor being taken off by the cruel deſpotiſm of the Eaſtern governments, the magazine is forgotten, ſome accident diſcovers it many years afterwards, and the corn is almoſt always found perfectly good in it. All the care they take, by way of preparing the grain, is to expoſe it two or three days to the heat of the ſun to dry it thoroughly before they carry it into the magazine.

In the dutchy of Lithuania, and in the Ukraine, the people always preſerve their corn in nearly the ſame manner, in wells or pits made in dry places: but great care muſt be taken there in the opening of theſe ſtores; for people who have deſcended into them, before they had had ſufficient communication with the freſh air, have been killed by the damps.

The Ruſſians too preſerve their corn under ground in deep pits of almoſt the figure of a ſugar loaf, wide below, and narrow at top. The ſides are well plaſtered, and the top is covered with ſtones. They are very careful to dry their corn well, generally by means of ovens, kilns, or ſtoves, for their ſummer is too ſhort to effect it ſufficiently, before it is laid into theſe repoſitories.

The ſame thing is practiſed with unvaried ſucceſs in the iſland of Malta: and alſo in Gaſcony, the Vivarais, and other ſouthern parts of France, the corn of which is remarkable for keeping many years longer than that of any other province in the ſame kingdom. M. Duhamel tried this method in the Gatinois: but his corn was ſoon ſpoiled there by its humidity when laid up; that country being ſubject to wet and moiſture, and his grain, in this trial, not having been previouſly dried in an oven or ſtove.

Upon the whole, it is evident from theſe, and from many more inſtances, which might be alledged, of the practice of other countries, that ſubterraneous granaries properly made, in a thoroughly dry ſoil, are the beſt of all repoſitories for keeping of the corn: but, at the ſame time, experience ſhews that this method will not ſucceed in our climate, the ſun here not having power to exhale the moiſture from the corn, ſufficently to prevent its fermenting when laid in a large heap. I muſt likewiſe add, that when one of theſe ſubterranean magazines is opened and expoſed to the air, it muſt be emptied immediately, and the corn taken out of it muſt be thoroughly ſifted and ſcreened, or it will ſoon corrupt. Some think it more nou-

nouriſhing, when it has been well preſerved, than that which has been kept in granaries above ground.

The marquis of Santa Cruz, author of many excellent remarks on the political and military ſtate of different nations, obſerves, that the corn of Galicia and the Aſturias will hardly keep from one year to another, becauſe of the humidity it contains, which rots and decays it: but that the corn brought thither from Caſtile will keep good many years. This laſt is therefore the only kind that the Spaniards ever venture to lay up in their public granaries: and the ſole difference, in M. Des Landes's opinion, between it and their other ſorts is, that it grows in a country where there is leſs rain in ſummer. They might indeed, if their religion and policy did not forbid their having intercourſe with the Moors of Barbary, once their conquerors, eaſily import from Africa plenty of ſome of the beſt corn that the world affords, perfectly ripened, thoroughly dried, and, in all reſpects, fit for keeping many years.

The great objection to public granaries, even in countries where the uncertainty of the climate, the indolence of the people, the ill-judged form of government, and various other cauſes frequently combine to render them highly neceſſary, is the expence attending ſuch eſtabliſhments; generally ſo great, that none but a monarch, or a ſtate can properly undertake them: and they, moſt certainly, cannot do any thing more laudable, more truly noble, in countries whoſe misfortune it is to be expoſed to the dreadful calamities of want and famine, or to depend upon the precarious aſſiſtance of their neighbours.

Tho' ſubterranean repoſitories for the keeping of corn are preferable to all others in countries proper for them; yet, even the common granaries may, with due care, and perhaps ſome few alterations, be rendered much more ſerviceable than they generally are. The principal cautions neceſſary to this purpoſe are, 1. To guard againſt the too great humidity which always prevails in places where there are many doors and windows: 2. To prevent a too free acceſs of the external air, becauſe this brings in with it the eggs of a vaſt number of different inſects, which prey upon and deſtroy the corn: and 3. To take care that the corn be thoroughly dry, and as clean as poſſible, when it is laid up. Theſe are the three general rules to prevent its corrupting.

The chief cautions to be obſerved in the erecting of granaries are, to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. Sir Henry Wotton, and Mr. Worlidge agree particularly in theſe; both judiciouſly adviſing a northern aſpect for theſe buildings, becauſe that quarter is cooleſt and moſt temperate; and the latter rightly obſerving, in general, that the beſt granaries are thoſe built of brick, with quarters of timber wrought in the inſide, whereto to nail well joined boards ſo cloſely to the wall, that there be no room for vermin to ſhelter themſelves. Floors of plaſter are reckoned the beſt, becauſe they are cool in ſummer, and if well made, do not retain dampneſs in the winter. There may be ſeveral ſtories one above the other; for the ſhallower the corn lieth, the better it will keep, and the more eaſily it is turned. Some have a ſmall hole in the floor of their upper granary, thro' which the corn deſcends into the lower one, like the ſand of an hour-glaſs; and after it is all come down into the loweſt granary, it is conveyed back into the upper one; ſo that it is kept in continual motion, which is a great means of preſerving corn.

The granary in the city of Schönbank, in the vale of Parinburg upon the river Elbe, which is a ſtore-houſe for the wheat of which the mum is made at Brunſwick, is built nearly in this manner. It is three hundred feet long, eighteen feet wide within, has ſeven ſtories, each of which is ſeven feet high, and large windows all around, to open and ſhut cloſe according as the wind ſits. By this means, the droſs and duſt are carried off as the corn is turned; for which a weſt wind is always preferred, becauſe it is the drieſt. At each end of this granary, and in the middle, are ſtoves for fire in damp weather, and at the going away of great froſts and ſnows, to prevent moiſture. There are alſo on each ſide of this building three long troughs or ſpouts, in the upper loft; and in fair weather men throw the corn out of this loft into thoſe ſpouts, through which it falls into others, about ten feet wide at the top, and eight or ten inches at the bottom, by which it is conveyed into the lower ſtory, from whence it is wound up again by a crane fixed in the upper loft. By thus falling from one ſtory to another, the corn is cleanſed by the wind from all duſt and chaff, and receives the benefit of the air, &c. Theſe troughs, or ſpouts, are put on and taken off as occaſion requires, to any of the windows; that when veſſels come to lade corn, it may be conveyed, through them, into the proper barges, without being carried thither by men, or cattle. The wall of the two firſt ſtories is two bricks and a half thick, that of the three next is two bricks thick, and the thickneſs of the two uppermoſt is a brick and a half. Fourteen thouſand quarters of corn may be kept in this granary.

Mr. Mortimer, who gives us this account, which is taken originally from captain Andrew Yarranton's England's Improvement by Sea and Land, adds, that the ears of corn, cut off from their ſtalks, and packed up cloſe in a tight caſk, will keep very well, and that this is the beſt, he indeed ſays, the only way of carrying any ſort of corn over the ſea, in order to ſow it in a foreign country.

The public granaries at Dantzick are ſeven, eight, or nine ſtories high, and have a funnel in the middle of every floor, to let down the corn from one to another. They are built ſo ſecurely, that the corn does not contract any damp, though they are ſurrounded with water on every ſide, in ſuch manner that veſſels come up to the very walls for their lading, which is let down into them, likewiſe thro' pipes or funnels, with very little labour and charge. No houſes are ſuffered to be built near them, for fear of accidents by fire.

At Zurich, in Swiſſerland, corn is kept eighty years, or more, in the public granaries, which are very ſpacious, and well aired by means of many ſquare wooden pipes which paſs through them.

The twelve companies of London with ſome other companies and private perſons, had formerly their granaries at the bridge houſe in Southwark, under the ſuperintendance of a juſtice of the peace, a ſteward, and two maſters. Theſe granaries were built on two ſides of an oblong ſquare (now uſed for a wharf) one of which ſtood north and ſouth, and was near an hundred yards long. Along this ſide were lattice windows which faced the north-eaſt; and on the other ſide, which was about fifty yards long, the windows

dows looked to the north. The oppoſite ſides had no apertures. All the windows were about a yard high, without any ſhutters, and ran on in a continued ſeries, with very ſmall partitions, ſufficient only to nail the lattices to. Each of theſe granaries was three or four ſtories high; but the loweſt, or ground ſtory, which was twelve feet high, was uſed only for a ware-houſe.

In Kent, two ſquare holes are made at the end of the floor, and a round one in the middle, by means of which the corn is thrown from the upper into the lower rooms, and back again, the better to turn and air it. The ſcreens uſed on this occaſion are made with two partitions to ſeparate the duſt from the corn. The duſt falls into a bag, and when it is ſufficiently full, it is thrown away, the pure and good corn remaining behind. By theſe means corn has been kept thirty years in this country: and it is obſerved, that the longer it is kept, the more flour it yields in proportion, and the purer and whiter the bread is; only the ſuperfluous humidity evaporating in the keeping: for grain does not diminiſh in weight or bulk, after the firſt year.

The uſual way of preſerving it in our common granaries is, after it has been well ſifted and ſcreened, to ſpread it upon the floor about ſix inches thick, to turn it twice in a week, and to repeat the ſcreening of it once a week, during the firſt two months. It is then laid a foot thick, for two months more; and in this time it is turned once a week, or twice, if the ſeaſon be damp, and now and then it is ſcreened again. At the end of five or ſix months, it is raiſed to the thickneſs of two feet, turned once a fortnight, and ſcreened once a month, or as occaſion requires. After a year, it is laid two feet and a half or three feet deep, turned once in three week or a month, and ſcreened in proportion. When it has lain two years, or more, it is turned once in two months, and ſcreened once in three, and how long ſoever it is kept, the oftener it is turned and ſcreened, the better the grain will be preſerved. An empty ſpace, about two feet or a yard wide, is always left on each ſide of the corn, to prevent its running down holes or chinks at the edges of the floor, and to remove it from all moiſture that may proceed from the ſweating of the walls, or from any defect in the roof; and another ſpace is commonly left along the middle of the heap, if it be a wide one, to facilitate the turning of it as often as is needful. This is the general cuſtom; and experience has ſhewn it to be neceſſary in the uſual manner of keeping grain.

But all the foregoing methods of preſerving corn in granaries above ground are attended with very great expence, by reaſon of the vaſt buildings which they require, and the many ſervants neceſſary to be employed to take care of theſe ſtores: beſides which, too much depends here upon the aſſiduity, ſkill and probity of thoſe ſervants; and the grain is ſtill liable to be preyed upon, waſted, and ſpoiled, by vermin and inſects.

"It is commonly ſaid that a farmer cannot thrive, who for want of money is obliged to ſell his wheat under five ſhillings a buſhel; but if he will ſell it dear, he muſt keep it when it is cheap; and his way of keeping it is in the ſtraw, uſing his beſt contrivance to preſerve it from the mice.

"The moſt ſucure way of keeping a great quantity of wheat that ever I heard of, is by drying it. When I lived in Oxfordſhire, one of my neareſt neighbours was very expert in this, having practiſed it for great part of his life. When wheat was under three ſhillings a buſhel, he bought in the markets, as much of the middle ſort of wheat as his money would reach to purchaſe. He has often told me, that his method was to dry it upon a hair cloth, in a malt kiln, with no other fuel than clean wheat ſtraw, never ſuffering it to have any ſtronger heat than that of the ſun. The longeſt time he ever let it remain in this heat was twelve hours, and the ſhorteſt about four hours. The damper the wheat was, and the longer intended to be kept, the more drying it requires: but how to diſtinguiſh nicely the degrees of dampneſs, and the number of hours proper for its continuance upon the kiln, he ſaid, was an art impoſſible to be learnt, by any other means than by practice. About three or four and twenty years ago, wheat being at twelve ſhillings a buſhel, he had in his granaries, as I was informed, five thouſand quarters of dried wheat, none of which coſt him above three ſhillings a buſhel.

"This dry wheat was eſteemed by the London bakers to work better than any new wheat the markets afforded. His ſpeculation, which put him upon this project was, that it was only the ſuperfluous moiſture of the grain, that cauſed its corruption, and made it liable to be eaten by the wevil; and that when this moiſture was dried out, it might be kept ſweet and good for many years; and that the effect of all heat, of the ſame degree, was the ſame whether of the ſtraw or of the ſun. As a proof, he would ſhew, that every grain of his wheat would grow after being kept ſeven years.

[This is an excellent, ſafe, and cheap method of keeping wheat; and with regard to the difficulty of judging the proper degree of heat, that is eaſily determined by the thermometer—And the length of time it ought to be dried, may be known by thoſe who are judges of wheat, in the ſame manner as they judge of the quality of it at market.]

"He was a moſt ſincere, honeſt yeoman, who from a ſmall ſubſtance he began with, left behind him about forty thouſand pounds; the greateſt part whereof was acquired by this drying method." *Tull's Huſbandry, page* 65.

To obviate the inconveniencies, and to point out an eaſier, cheaper, and ſurer way of keeping all ſorts of grain, in granaries, in the other methods before mentioned, is the principal deſign of M. Duhamel's excellent Treatiſe on the Preſervation of Corn; in which, after rightly noticing the ſeveral diſadvantages attending the common practiſe, he propoſes a method founded in reaſon, and on his own repeated experience, as well as that of others, whereby a large quantity of corn may be preſerved in a ſmall ſpace, during a number of years, without danger of its heating, fermenting, or contracting a bad ſmell or taſte, and ſecure from the ſpoil of animals and inſects, at a trifling expence, and with very little trouble. All theſe deſirable ends may be obtained, in ſome caſes, by ventilation only; in others, by drying the corn in a kiln over a ſtove; and in others again by both theſe methods. *See the article* VENTILATION.

A letter to Dr. Templeman, ſecretary to the ſociety for the encouragement of arts, manufactures and commerce, deſcribing a new invented granary for preſerving grain.

"SIR,

"Where public utility is in queſtion, a private apology becomes unneceſſary: accept, therefore, without ceremony,

ceremony, the following hints to be laid before the ſociety.

"I have long been of opinion, that a method of preſerving grain from decay is much wanting; but it muſt be, to anſwer any good purpoſe, eaſy in its execution, and cheap in its proceſs.

"The method now practiſed, of laying wheat in a room or granary, and turning it frequently with ſhovels, and ſometimes ſcreening it, is ſubject to many inconveniencies: it muſt be laid very thin, or it is apt to ferment; and by being laid thin it takes up ſo much ſpace, that to lay up and keep five hundred quarters for three years only, would be conſiderably expenſive.

"Could we preſerve our corn for a number of years, it would not only be of great ſervice to the public, but of no ſmall benefit to the farmers. For want of doing this, we find a great, and often a ſudden, variation in the price of bread-corn; wheat will one year ſell for five pounds a load, (that is five quarters) and the next year it will riſe to fourteen or fifteen pounds, or even higher.

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"Were the intereſt of the community to be conſulted, no man ſhould be allowed to rent above three hundred acres of land: the profits of ſuch a farm will, with proper regulations, maintain a family decently and well; and it is not requiſite, or even ſalutary, that farmers ſhould acquire large fortunes.

"But to return to my ſubject. Were a proper method projected for keeping wheat good for a number of years at a ſmall expence, all this would be remedied, our lands would no longer be monopolized, and corn would from year to year vary very little in price. This ſtands to reaſon; for in a very plentiful year a farmer would not ſell his corn too cheap, if he had the power in his hands to lay it up without great charges; and when the crops by any acccident failed, the price of corn would not greatly riſe upon the poor manufacturer and labourer, as what had been ſome years before laid up would now of courſe be ſold at a reaſonable price, and make up the deficiency, and this without loſs to the farmer, and with great benefit to the community in general.

"This intereſting ſubject has for many years, employed my thoughts and attention; and I have in conſequence imagined, and even executed in miniature, or rather in ſmall dimenſions, a plan, which will, I have reaſon to think, anſwer the important purpoſes above mentioned: my whole plan conſiſts in building a proper granary, (the conſtruction of which will not coſt much (which will keep corn for any number of years ſound, ſweet, and good, and that with very little annual expence.

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"I imagine there are few, who have made this part of nature their ſtudy, but will allow the above poſitions: I ſhall therefore, without farther prelude, inform you in what manner I effect this at a ſmall expence.

"The granary I would recommend conſiſts of ſeven ſtories of floors, and may be built in any dimenſions, provided proper proportions are adhered to.

"The form of it is ſquare; and I ſhall at preſent ſuppoſe it to be fourteen feet ſquare within the rooms or cells; the diſtance of the floor from one cell to the floor of that above it is to be five feet: and the whole building ſhould ſtand on ſtrong poſts, more or leſs in number according to its dimenſions, at the diſtance of ſix feet from the ground: the ſmall ſtairs, or rather ladder, to go to the ſeveral cells, muſt be fixed to the outſide of the building ſide-ways, with a leading rail or rope to prevent falling.

"The whole granary is to be built of what is generally called brick-nogin; that is, the whole is firſt framed in ſtrong timber-work, and the interſtices filled up with brick-work: the floors, beams, and joiſts, muſt be made ſtrong to bear the weight of the corn; the inſide of the cells muſt be well lined with dry oak-boards, cloſe jointed, ſo as to leave no cracks; and the outſide muſt be weather-boarded, the boards being ſtrongly nailed to the timber-work of the frame, and afterwards payed over with pitch. The floors of the cells muſt be ſo contrived as to ſhelve towards the middle, in which part is to be an aperture ſix inches ſquare, to be opened, or cloſed by means of a ſliding ſhutter, which muſt have a long handle reaching in a groove without the granary.

"On three ſides of the rooms there muſt be a window, ſtrongly latticed, covered with wire to keep out larger inſects and birds, and with ſtrong ſhutters to defend the corn from the weather; on the fourth ſide is a door to each room to open from without: the windows are to be ſmall, and as cloſe as poſſible to the cieling: over the upper room or cell for the corn is a loft, on the outſide of the door of which is fixed a crane to be worked within, by a winch and flyers.

"The uſe of the windows in the ſides of the rooms, is to give the corn all the benefit it can receive from the wind and freſh air: the door, when the cell is empty, gives the workmen entry to ſweep, duſt, and clean it.

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"The ſacks are then craned up into the loft, and emptied, through a hole made for the purpoſe, into the uppermoſt cell, whence it falls through the apertures till

it reaches the floor of the undermoſt cell but one, where it is ſtopped by that aperture being ſhut.

"When this cell is filled to the height of about two feet from the floor, which may be ſeen through the lattices, the aperture in the floor of the third cell is ſhut by means of the ſlider: the workmen then continue craning up the ſacks till all the cells are filled in the like proportion, except the undermoſt, obſerving the proper opportunities of ſhutting the apertures.

"In this condition the corn is left for a week, or ſomewhat longer, if it was got in very dry.

"The firſt ſtirring it receives, occaſions very little trouble: when it has been in the granary about a week, a workman, after having ſwept and cleaned the undermoſt cell, which was left empty, opens the aperture in the floor of the ſecond cell, by drawing the ſlider back: this lets the corn fall from the ſecond, into the undermoſt cell, the windows of which being open, the corn receives great benefit, as it falls, by the current of air that paſſes through the cell.

"When the ſecond cell is empty, the aperture in the floor of it is ſhut, and the workman, going in at the door, by means of the ſtairs on the outſide of the granary, ſweeps and cleans it from all impurities, in order to prepare it for receiving the corn of the third cell, the aperture of which is next opened, and the floors being all made ſhelving towards the middle, the corn falls gradually through, in the ſame manner it did from the ſecond to the undermoſt cell.

"In this manner they are all managed, till at laſt the uppermoſt cell remains empty.

"It is then left for another week, when two workmen muſt for a ſmall ſpace of time be employed: one of them goes up into the loft at the top of the granary, to work the crane, and the other takes his ſtation on the ground under the floor of the undermoſt cell: under the aperture in this floor he firſt fixes a ſcreen, upon which the corn falls, and then, by means of a conductor at the foot of the ſcreen, drops into the mouth of a ſack which hangs to it, the bottom of the ſack reſting on a miller's hand-barrow: when all is prepared, he draws away the ſlider and lets the corn falls on the ſcreen.

"When the ſack is full, the ſlider is for a moment cloſed, till another ſack on another barrow, is put under the conductor: the workman then wheels the firſt ſack to the outſide of the granary, and faſtening the crane rope to it, makes the ſignal for the other to draw it up. Whilſt this is doing, the ſecond ſack is filled, which is wheeled and drawn up in the ſame manner; and this method is purſued till the undermoſt cell is empty.

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"After the firſt month the corn need be ſtirred in this manner only once a fortnight, and after the firſt ſix months, only once a month, unleſs the weather ſhould prove, in autumn, very hot and damp.

"This then, Sir, is the manner in which I have for ſome years managed my wheat, and find it anſwers very well, the vegetative quality of the corn being preſerved in full vigour, and no ſigns being diſcoverable in it of a tendency to fermentation.

"My country hovel is at ſome diſtance from London, in a retired quarter, conſequently unnoticed; and there being but little probability of this eaſy method's being ſufficiently known by my practiſing it, is the reaſon of my troubling you with this long letter, flattering myſelf that by your means it may make a proper appearance in public. Had vanity been my predominant paſſion, I might have preſented it to the ſociety in perſon, which as a member I had an undoubted right to do; but this would have been encroaching on my beloved obſcurity: to you, therefore, Sir, do I truſt this child of my invention; and if in your hands he can be trained ſo as to be of public utility to my country, my every purpoſe is fully anſwered."

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ceremony, the following hints to be laid before the ſociety.

"I have long been of opinion, that a method of preſerving grain from decay is much wanting; but it muſt be, to anſwer any good purpoſe, eaſy in its execution, and cheap in its proceſs.

"The method now practiſed, of laying wheat in a room or granary, and turning it frequently with ſhovels, and ſometimes ſcreening it, is ſubject to many inconveniencies: it muſt be laid very thin, or it is apt to ferment; and by being laid thin it takes up ſo much ſpace, that to lay up and keep five hundred quarters for three years only, would be conſiderably expenſive.

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"On three ſides of the rooms there muſt be a window, ſtrongly latticed, covered with wire to keep out larger inſects and birds, and with ſtrong ſhutters to defend the corn from the weather; on the fourth ſide is a door to each room to open from without: the windows are to be ſmall, and as cloſe as poſſible to the cieling: over the upper room or cell for the corn is a loft, on the outſide of the door of which is fixed a crane to be worked within, by a winch and flyers.

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"This gentleman's method is much the ſame as at Dantzick, and other places abroad, where they have public granaries for the preſervation of corn; and is not neceſſary nor adviſable to be practiſed in England.—Not neceſſary, becauſe our harveſts are, in general, more plentiful, than in thoſe countries where they have ſuch repoſitories for corn.—And not adviſable, on account of the prodigious expence of erecting and repairing thoſe granaries throughout England; the continual expence of men to ſtore, move, and deliver the corn, and the waſte in long keeping. But admitting that the ends propoſed by thoſe granaries were obtained, viz. reducing the price of corn, and keeping it conſtantly at a more moderate price than it is now, after bad harveſts, what would be the conſequence? Not a regular uniform lowering of the price: for in that caſe, the farmers would have no expectation of making any conſiderable advantage by cultivating corn, which would be a certain means of diſcouraging the culture of it, and the cauſe of a real ſcarcity; and then the public granaries could not be ſupplied at a price ſo low, as would be of any advantage to the manufacturer and labourer. In moſt of thoſe ſtates, where public granaries are in uſe, they do not raiſe corn ſufficient for the people, their dependance, in great meaſure, being upon their hoarded corn. But in England, corn is an article of commerce, and a very valuable one, amounting in the century laſt paſt, to a clear profit of many millions ſterling; beſides the invaluable advantage of the ſurpriſing advance of agriculture, conſequent upon the encouragement given to the farmers, by the exportation of corn: a meaſure whereof the good effects are evident, enriching the kingdom, and at the ſame time ſupplying the inhabitants with bread, in a cheaper and more plentiful manner than thoſe of other countries, who have neglected agriculture, and depended upon public granaries.

The ſcheme above propoſed of granaries, fourteen feet ſquare, and ſeven ſtories of floors, would keep but a ſmall quantity of wheat, and be attended with an expence as great, or greater, in proportion, than the large public granaries, both in their firſt erection, and in the expence of men and waſte of corn; and ſo far as they are ſimilar to the larger, would in general, be attended with the like bad conſequences to the community: or if not altogether ſo hurtful, at whoſe expence are they to be erected? Few landlords would be at that expence, and few farmers could afford it. And ſuch farmers as could afford to erect them, would hardly be perſuaded to lay out ſo much money upon ſo uncertain a proſpect, eſ-

pecially as the farmer cannot have any benefit from his money thus laid out, upon quitting the farm: for the landlord will not allow him to take away the granary, and if he was allowed that liberty, it would then be of little advantage to him to carry away the old materials: ſo that upon the whole, it is not probable that this ſcheme will ever be adopted to any general benefit.

It is therefore apparent that where corn can be kept by the farmers, they are the propereſt perſons to keep it: for the removal of it from them, and laying of it up in any manner, will always be attended with a greater expence, and for that reaſon will come dearer to the conſumer, than if it remained in the farmer's poſſeſſion.

When the price of corn advances pretty high, and they ſee ſeveral ſtacks of corn in the yards of ſome of the wealthieſt farmers, the lower claſs of people becomes extremely clamorous, charging the farmers with extortion and combination. That they endeavour to keep up the price cannot be doubted, as they look upon corn to be an article of merchandize, and are too often prompted by a covetous diſpoſition, to keep up the price as high as they can: but in regard to a general combination among farmers, it is impracticable, for obvious reaſons; and the poor ſhould look upon ſuch farmers who keep ſtocks of corn as their beſt friends: for ſhould they ſell all, as the little farmers are obliged to do, where elſe could the poor be ſupplied with bread, ſo cheap as from the farmers? If they have it from the dealers in corn, who hoard it, in expectation of profit, by the price advancing, the poor muſt in that caſe pay the advanced price, which includes not only the prime coſt paid to the farmer, but likewiſe all the ſubſequent advances upon it, of commiſſion, carriage, warehouſe-room, and the corn dealers profit. Or if the corn is imported, the additional expences will be ſtill greater to the conſumer. Hence it is evident, that the poor cannot have bread in any way ſo cheap as from the farmers; and that it is the intereſt of the community to encourage and aſſiſt them to keep ſtocks of corn.

If corn is kept ſome years in ſtacks, it is liable to ſeveral caſualties; the thatch is apt to be blown off, and let in the rain, and to ſink down at the tops of the ſtack; in both which caſes, which are very common, the corn will be damaged there, and to a conſiderable depth, unleſs great care is taken, and often examined, to prevent the damage. The ſtraw is loſt, or fit for nothing but dung, which, in moſt ſituations, is a conſiderable loſs to the farmer. Another, and ſtill greater loſs, is by the mice and rats eating and waſting the corn, which is often difficult to prevent; for even the method of ſetting corn ſtacks upon ſtaddles, which is a very good way, is not only attended with expence, but is ſometimes ineffectual; becauſe theſe vermin lodge in the ſheaves, and in them are carried from the field into the ſtacks, or then get into them, by climbing up ladders, &c. that happen to be ſet againſt the ſtacks; and when this happens, and the corn is kept in the ſtacks for ſome years, they multiply incredibly; inſomuch that often a very large proportion of the corn is deſtroyed by them; and there have been inſtances of their deſtroying all the corn in a ſtack.

Preſerving corn in the grain, after it has been thraſhed out, is in many reſpects preferable to keeping it in the ſtraw; and the method of doing it, related by Mr. Tull, appears to be very ready and cheap, and may be practiſed by every farmer, eſpecially with the aſſiſtance of a thermometer. The method alſo of keeping corn in granaries of preſervation, is a very good one, and the above objections to it are fully obviated by what has been ſaid on that head, confirmed by the experiments of Dr. Hales, M. Duhamel, and others before-mentioned. That wheat may be preſerved perfectly ſweet for many years, by the aſſiſtance of kiln drying and ventilation united is undeniable, nor is there any doubt of ventilation alone being quite ſufficient in general; and in very unfavourable ſeaſons, the wheat may, for the greater ſafety, be firſt kiln dried. And perhaps the effect of the kiln drying may be aſſiſted, by ventilating it with warm or hot air at firſt, and till the moiſture is diſcharged from it.—Upon the whole, the preſervation of corn by the farmers is a matter of ſuch importance and general concern to the community, that every perſon ſhould endeavour to contribute all they can to the ſucceſs of it."

A method of preſerving corn, different from the others above-mentioned, has been practiſed with ſucceſs by M. Marcel de Meziers of Switzerland, which he relates as follows:

"As ſoon as the harveſt is got in, I give the corn in the barn as much air as poſſible, to haſten the drying of the ſheaves, which I find to be a matter of ſome importance.

About the middle of Auguſt, I get my wheat threſhed out. It coſts me indeed ſomething extraordinary; but I have ample amends made me, as it threſhes, dreſſes, and dries better; is no longer ſubject to the depredations of the rats and mice; to the thefts of ſervants and labourers; to receiving damage by damps and hard rains; or to ſhedding in the barn, great part of which ſheddings is generally loſt. When the farmer, with the view of ſaving a trifle, puts off the threſhing of his wheat till the winter, moſt of thoſe loſſes are felt.

After the firſt day, I cauſe all they have threſhed to be brought into a large room, the windows of which to the eaſt and ſouth are opened, and the floor being made very clean, is covered two inches thick with the corn. As ſoon as it is dry enough, which may be known by its rattling when you pour it out of one hand into the other, I have it ſcreened, which ſeparates from it all the under corn, ſeeds of weeds, and duſt.

I have ready ſome ſacks, made very narrow, of coarſe cloth, which have been dipped in a ſtrong lixivium, ſeveral handfuls of green oziers having been put into the lye, and into the copper cauldron where the lye was boiled. The reaſon of doing this will preſently appear.

The ſacks being well filled and faſt tied, hold about three buſhels (Engliſh) each. When all my ſacks are filled, two treſſels, about three feet high, with the backs rounded, and about eight inches wide, are ſet one beſide the other. Upon theſe treſſels, ſix ſacks are laid, at ſix inches diſtance one from the other; on the intervals, five more are laid, then four, three, two, and one; ſo that the whole number ſeems to form a pyramid, conſiſting of twenty-one ſacks. Other treſſels of the ſame kind are uſed, for what ſacks remain to be piled.

When this work is completed, and the ſacks are all placed in proper order, I cauſe the ſhutters and caſements to be cloſed, and the double curtains of the windows to be drawn: the double doors are alſo ſhut, and I keep the keys in my bureau. I never touch this ſtore but for the uſe of the family, and for ſale; and it is very eaſy for me to diſtinguiſh which part is to be applied to thoſe ſeveral

uſes,

uſes, as I always have the precaution to pile them on different treſſels.

Experience having convinced me, that every body, whether liquid or ſolid, which contains in itſelf any principle of fermentation, is moſt inclined to have that principle ſet in motion when it is long left in one ſituation without being moved: I never fail, towards the latter end of the month of March following, of having all the corn in my ſacks again ſcreened, obſerving when they are filled, to make them the ſame weight they were before; when they are once more laid on the treſſels in the former order. About the end of June, I think it enough to empty the ſacks, one into another, and replace them.

When I want my room for the new corn, I cauſe that of the laſt harveſt to be carried to my town-houſe, where it is placed in the ſame order as it was in the country. In the month of October, the corn which was carried to town, is all ſcreened, and ſifted in a wire ſieve, after which it is in order to go to the mill. This corn is intended for the conſumption of the following year: ſo that the wheat which I grew in 1761, ſerves me for the year 1763.

As I always ſend to town more than I have occaſion for to ſupply the wants of my family, particularly when it is good in quality and low in price, I have preſerved wheat in the manner above related for five years and upwards, without there being any viſible difference, betwixt the grain ſo kept and that only one year old. I have purpoſely made bread of both ſorts, at the ſame time, and diligently comparing one with the other, there appeared not to be the leaſt advantage in point of goodneſs on either ſide.

It is true, that apprehending the dryneſs of the corn might occaſion ſome inconvenience in the grinding, I cauſed the old wheat to be waſhed in ſeveral waters, till the water came away pure and unſullied; for the firſt water was dirty, and of a browniſh colour: the wheat being afterwards dried, grinds very well. By this operation, the bread becomes whiter and ſweeter, and I have experienced the ſame with regard to new wheat.

I may then ſafely conclude that in this manner corn may be preſerved much longer than the time I have mentioned above to have experienced, without ſuffering any ſenſible damage; particularly, as all the damage to be apprehended, muſt proceed from the inward moiſture of the grain, which moiſture muſt doubtleſs be inſenſibly diſſipated, in the ſpace of five years. If I miſtake not, the following inferences may be drawn from the facts above-menioned.

1. That threſhing out wheat as ſoon as poſſible after harveſt preſerves it from the damage and waſte which muſt neceſſarily be the conſequences of keeping it too long unthreſhed in the barn.

2. That by putting it up in ſacks when it is ſufficiently dried, we guard againſt a winter's fermentation.

3. That the treſſels keep it out of the way of rats and mice, and prevent its being damaged by any moiſture, which might proceed from the floor.

4. That the ſacks being impregnated with the powerful bitterneſs of the ozier, keep it from being attacked by any kind of inſect, even flies; ſo much do they avoid this bitterneſs.

5. That the room being cloſe ſhut, prevents the alterations from the exterior air from having any ſudden effect; on which account theſe alterations are to be leſs apprehended, and indeed ſcarcely at all.

6. That in caſe any ſudden tempeſts of wind and rain ſhould damage the room, and expoſe the corn to be wetted, it will be a very eaſy taſk to remove the ſacks, from the round ſurface of which the water will run off without ſoaking in; and if any ſhould by chance be wetted, it will be eaſy to diſcover where the damage is done.

7. That every room which can be cloſe ſhut, is fit for this purpoſe; as a ſhed built of timber frame-work, and lathed and plaſtered within, will be as fit for this uſe, as the moſt elegant granary built of free-ſtone. This is no ſmall advantage.

8. That laſtly, this method is neither troubleſome, expenſive, nor requires much attendance; the ſeveral operations being very eaſy, and to be done at ſeveral diſtant times.

The owner has it in his power, at the ſlighteſt view, to know what quantity of corn he is poſſeſſed of, and as he keeps himſelf the keys of his ſtore room, it is as ſafe as the money in his cheſt.

In my method I guard as much as poſſible againſt the entrance of the air and light.

This way of preſerving wheat in ſome ſort anſwers the end that is propoſed by kiln drying it, which conſiſts of drying corn in order to promote its preſervation: all the difference is, that one operation is quick and forced, and the other requires more care and time.

The queſtion may be reduced to this ſingle point, which of the two methods with the moſt certainty preſerves the corn without diminiſhing its natural ſubſtance; and with making the leaſt alteration with reſpect to its nutritive and ſalubrious qualities.

I think myſelf obliged to acknowledge, that the kilns will moſt probably contribute to the longer preſervation of the grain; but then I cannot heſitate aſſerting, that the other method will promote moſt the preſervation of thoſe qualities in the corn, which are ſo eſſential to the uſes for which it is intended. The uſes of wheat are, to make good bread, and for ſeed. In the above inſtance quoted from Mr. Tull, the kiln dried wheat was very proper for ſeed, ſeven years after it was ſo dried; and was by the London bakers preferred to other wheat, not kiln dried, for making bread.

Let us now, as oppoſed to the method I propoſe, make a few remarks on the preſervation of wheat, in magazines or granaries, where it is laid in heaps.

It cannot but be acknowledged, that it is in this manner much more expoſed to be injured by the alterations in the air, particularly in damp weather the moiſture ſoon penetrates the floors, and the corn ſuffers accordingly.

It is beſides very rare to find any corn, after being twelve or fifteen months in the granary, but what is attacked by weevils, and other pernicious inſects. In caſe the roof ſhould not happen to be weather proof, the leaſt cracks are moſt dangerous. Let a ſingle quart of water be, in ſummer time, poured into the middle of a large heap of wheat, and it is incredible to think what damage will be done in a ſhort ſpace of time.

It is needleſs to enlarge on the infinite number of inconveniencies which are known to attend this method of preſerving grain, and by which ſuch heavy loſſes have been frequently ſuſtained.

It may perhaps be objected that this method, though very proper to be adopted by a private perſon, would be too expenſive for a conſiderable magazine of corn, on account of the number of ſacks which would be required.

I acknowledge that a conſiderable number of ſacks will be neceſſary, yet is not this ſo expenſive an article as may be imagined. If the ſacks are bought at the firſt hand, they will coſt leſs than a ſhilling a-piece; and, with care, they will laſt long enough amply to repay their firſt coſt.

The ſacks certainly contribute to preſerve the corn in good order, prevent waſte, and are a ſecurity againſt private embezzlements. Laſtly, as they are very eaſily removed, the corn may more certainly be ſaved, in caſes of ſudden fire or inundations. On the contrary, in theſe caſes, how many difficulties are there to ſurmount when the corn is kept in large heaps in a granary.

Having no deſire to form a ſcheme of a public nature, I have been content honeſtly, and in plain terms, to relate what I have come to the knowledge of, by many years experience, and to lay open the inconveniencies which may attend the laying up of wheat, in the methods hitherto practiſed. This object is of too great importance for me to be under any apprehenſion that any one will think meanly of me for writing on this ſubject.

I have omitted all long diſquiſitions, leſt I ſhould have extended this paper to too great a length: for inſtance, if we exclude the air and light, no inſects will annoy the corn: but can we at the ſame time be ſecure that the wheat will not ferment, grow muſty, and ſuffer ſome alteration for the worſe. By guarding againſt the action of the air we do not exclude the air itſelf, which is too ready to enter at every crack. When air is not in motion, it contracts a kind of corruption: is it not then natural, that it ſhould then communicate this corruption to bodies containing air? Let a dungeon, which has been long cloſely ſhut, be opened, and a diſagreeable ſtrong ſmell will ſurely iſſue from it; we muſt then conclude, that a circulation of the air is neceſſary. The only queſtion remaining is, how far this circulation may be permitted to take place, ſo that the alterations may not be too ſudden."

"This method of preſerving wheat was not publiſhed, as the author takes notice, as a ſcheme of a public nature, which does not leſſen the value of this, or any ſcheme, calculated to render the preſervation of corn eaſily practiſed by private perſons; but, on the contrary, is a great-recommendation of them, the principal point in view being, to have a ſtock of ſound corn in hand, ſufficient to anſwer the general conſumption, which cannot in any other way be obtained, and ſo cheap to the conſumer, as in the hands of private perſons, of ſmall or moderate capitals, particularly the farmers or growers of corn; for every ſtep it is removed from them, inevitably loads it with an additional expence, which falls upon the conſumer. For this reaſon we have enlarged upon this head, as it is of great importance to the community, and have exhibited the ſeveral and moſt approved practical methods of preſerving corn with the greateſt certainty, and at the ſmalleſt expence.

And here, as objects of conſequence, and nearly connected with the ſubject, we would recommend to farmers to keep their corn lands in particular as clean and free from weeds as poſſible, and to bind up their corn in ſmall ſheaves; both theſe will contribute to their getting in the corn in good order, in catching harveſts, and render it the fitter for preſervation."

"I forgot to obſerve, that I have lately ſeen Monſ. du Hamel's methods of preſerving grain, by means of cheſts with falſe bottoms and ventilators.

"This method may in ſome caſes be of ſervice I allow; but I am nevertheleſs of opinion, that corn cannot be properly preſerved, unleſs the whole bulk of it be frequently ſtirred, which by du Hamel's method is not done; could the current of air be equally diſtributed over the whole cheſts, and in due proportion, I ſhould ſtill think it inſufficient to preſerve the corn; and if corn has been kept for ſome time in that manner, I ſhould rather be apt to attribute it to Monſ. du Hamel's firſt drying it on a kiln, before he puts it into the cheſts, than to any regular effect of the ventilators.

"Were I acquainted with this gentleman, I would recommend it to him, to make an experiment of his method in the following manner.

"Let him firſt fill a cheſt with dry corn that has not been on the kiln: another cheſt ſhould be filled with ſome that had been well dried, and a third with the ſame dried corn: let the firſt and ſecond cheſts, at proper intervals, be ventilated, and the third be kept without ventilating, in a dry place. Were this done, I am apt to think, that after ſix months, or a longer time, there would not be found ſo great a difference as ſome may imagine, betwixt the corn which was, and that which was not, ventilated.

"In my method, the expence, as well as hazard of drying is avoided, it being never neceſſary, unleſs when corn is got in very ſoft, in a wet harveſt; and then a common malt-kiln anſwers the purpoſe very well.

"I ſhould have mentioned, that in my method of preſerving corn, when by frequent ſtirrings it is become hard and brittle, it may be laid to the height of three feet, on the floors of the cells, without any danger of damage enſuing; for when it is hard, it is not ſubject to heat and ferment; neither are inſects ſo fond of attacking it.

"I have by this time, perhaps, tired your attention, and to be plain, am not unweary myſelf; ſhall therefore conclude with aſſuring you that I am, Sir,

Your very humble ſervant,

A MEMBER of the SOCIETY."

WHEE, *or* WHEY, a heifer.

WHINS, the ſame with furze. *See the article* FURZE.

WHISKET, a baſket.

WHITE-CLOVER, a well-known plant, and reckoned the ſweeteſt feed of any of the ſown graſſes; and it is of moſt advantage to the farmer, becauſe it is perennial, or laſts a great number of years on the land.

This plant ſends forth roots at every joint, ſo that it thickens, and ſoon makes a thick ſward. When land is to be laid down for paſture, the farmers will reap great profit, if, with about four buſhels of clean ſifted hayſeed to an acre, he ſows eight pounds of this clover; but it is to be remarked, that it is never to be ſown with corn.

It may be ſown either in ſpring or autumn; if in ſpring, it may be cut about the latter end of July; if ſown in autumn, the crop will be much earlier. As ſoon as ever the hay is off the land, it ſhould be rolled with a heavy

heavy roller. In laying down land with theſe graſſes, it will be proper for the farmer to be very careful that he cleans the land of all ſorts of weeds; and the hay-ſeeds are to be ſown firſt, immediately after which the clover is to be regularly ſcattered. After ſowing, the land ſhould be lightly harrowed, with a ſhort tined harrow, to bury the ſeed; and a few days afterwards, if the weather is dry, it ſhould be rolled, to break the clods and looſen it.

It will be good huſbandry, if, after the plants are come up, the farmer ſhould ſend in ſome weeders, to pull up all the tall rampant weeds which might injure the crop, for, if they are ſuffered to ſeed, they will ſoon ſtock the land.

It will be proper to take the advantage of dry weather, and roll the land three or four times, after the plants have attained ſome ſize; for the clover, as is already obſerved, taking root at every joint, the ſward will thereby be greatly thickened.

If a farmer knows his own intereſt, he will ſow ſome of this white clover-ſeed by itſelf, in order to ſupply himſelf with what ſeed he may want, for ſometimes it is very dear. The beſt ſeaſon for ſowing is autumn, upon dry lands, about the beginning or middle of September; but in open, cold lands, much expoſed, a month ſooner is better: all the caution required in this autumnal ſowing is to let the land be very well rolled in the month of October, before the froſts come on, and again in March.

WHITE-SCOUR, a diſeaſe with which ſheep are too often affected, and by which great numbers of them die.

The following medicine has been often given with ſucceſs, provided the ſheep are at the ſame time removed into a dry paſture.

> Take a pint of old verjuice, half a pound of common or bay ſalt, dried well before the fire, pounded, and ſifted through a ſieve. Then mix the verjuice with the ſalt by degrees; and add half a pint of common gin, and bottle it up for uſe. When any of your ſheep are ſeized with this diſorder ſeparate them from the flock, and give each of them three large table ſpoonfuls of the mixture for a doſe, repeating it two days after, if they are not better.

WHITE-LANDS, chalky lands.

WILDS, a term uſed by our farmers to expreſs that part of a plough by which the whole is drawn forwards.

WILLOW, the name of a well known tree, of which there are ſeveral ſpecies, ſome of which may be propagated to great advantage, particularly that known by the name of the Norfolk willow, as demonſtrated by the late Mr. North, in an Appendix to a little Treatiſe on Graſſes, publiſhed by him ſome years ago. As this pamphlet may have reached the hands of but few of our readers, and will, now the author is dead, be ſcarcely ever re-publiſhed; we were perſuaded it merited a place in our work, eſpecially as it may ſerve as an example of a profitable method of cultivating trees of this kind, that may be applied to ſeveral others, only obſerving a due regard to the difference of circumſtances.

Directions for propagating the ſound-growing Norfolk willow.

"This willow (I dare affirm) will prove very profitable to the planter, and of great utility to the kingdom in general. It will grow taller and larger in twenty or thirty years, than moſt other ſorts of trees will in ſixty or ſeventy. It grows very kindly, and great quantities may be propagated at a ſmall expence. A very conſiderable profit from it will come to the planter in five or ſix years after planting: in eight or ten years more another profit will ariſe much larger than the firſt; and at laſt, which will be in about twenty or thirty years after planting, the profit will be ſurpriſing, as I will make it appear in the ſubſequent account.

"In order to begin with this willow-plantation, the land muſt be ſecurely fenced from all kinds of cattle, and muſt be well ploughed or dug in winter, to make the ſurface looſe, and to kill the graſs and weeds. The ſeaſon for planting is from November to April, and ſometimes later. The dryeſt land ſhould be planted firſt.

"One year's ſhoots are beſt for ſets when they are deſigned to make large trees. The ſets ſhould be cut to eighteen or twenty inches long; about eight or nine inches of the thick or lower ends muſt be thruſt into the ground. A ſtrong ſhoot of one years growth will frequently make three or four good ſets, but I would not adviſe cutting any ſets from the very tops of the rods, becauſe they will be too weak to make ſtrong ſhoots the firſt year.

"The proper diſtance theſe ſets ſhould be planted, is about three feet promiſcuouſly. An acre will require about five thouſand. In June, after planting, the ſets ſhould be all looked carefully over: and ſuch as have more than one ſhoot, ſhould be reduced to one, and it ſhould be minded, to leave the uppermoſt and ſtrongeſt. The ſuperfluous ſhoots ſhould be cut off cloſe to the ſet, that the bark may ſooner cover the wound.

"At the ſame time the ground ſhould be hoed over to kill the weeds, and to looſen the ſurface, in order to ſow turnips, which will no ways hurt the ſets, but rather be of ſervice, provided they are properly hoed, and ſet out at good diſtances, and not ſuffered to grow within a foot of the ſets. The winter following, when the turnips are gone, the ground ſhould be dug all over, and, the ſummer after, the weeds cut down with hooks; which is the laſt, and all the labour of cleaning they will ever want. The beſt inſtrument to dig theſe plantations with, is the ſort of broad-tined fork they uſe in Kent to dig their hop-grounds. The price, by the acre, is twelve ſhillings for once digging.

"When theſe ſets have grown four or five years, about three-fourths of them muſt be dug up, in order to leave ſpace for the others to thrive. If they have throve well, in five years they will be above a foot in circumference, and twenty or thirty feet high. Theſe young trees will be very proper for many uſes, as for chair-makers, hoops, gates, hop-poles, &c. and will ſurely be worth three-pence a piece upon an average.

"From five thouſand ſets which are planted upon an acre, at about three feet apart, certainly three thouſand may be very properly taken away, and the remaining ones will not be left quite ſix feet apart. If theſe young trees are valued at but three-pence a piece,

they will be worth thirty-ſeven pounds, but I rather believe they will be worth more. Eight or ten years after the firſt thinning, three parts in four ſhould again be took up, which will be about one thouſand five hundred; and five hundred or more will be left at about twelve feet apart, which ſhould grow twelve or fifteen years longer, when they will be in fine maturity. The ſecond thinning will be of much more value than the firſt; upon an average, no doubt but they will be worth half a crown a tree at leaſt, as they will be tall and large, and may be put to divers uſes. Many of them will be very proper for maſts for ſmall veſſels, as the wood is light and tough.

"In twelve or fifteen years more, the remaining five hundred trees will be very tall and large, perhaps above ſixty feet high, and five or ſix feet in circumference. The leaſt value one may conceive muſt be twenty ſhillings a tree; ſo that, at the loweſt profit one can ſet upon the produce of an acre of land, planted with this noble willow, in about thirty years at moſt, it will be worth ſix hundred pounds, and all the rent, &c. paid at the rate of twenty ſhillings a year. I really think I have allowed too low prices for the growth, and that it is very probable they will be worth more. The wood of this tree is very white and tough, and without pith or ſap; ſo muſt be very proper for carvers, turners, &c. Boards of this wood are as good for floors, or wainſcoting common rooms, as any other. I am told, by a man of great veracity and judgment, that poſts of this wood, ſet in the ground, will outlaſt all other ſorts, except yew, or heart of oak. He alſo affirms, that there is no tree upon the earth ſo proper for ſhips maſts as this, as it is light and tough, and will not ſplinter, as fir does.

"This tree has oblong, pointed, ſaw-edged leaves of a moſt refreſhing light green: at the bottom of each foot-ſtalk grow two ſmall wings, which almoſt environ the young ſhoots.

"This willow will thrive upon almoſt any ſoil, ſo it be not too dry.

"It is alſo the beſt kind to plant, in large ſets, by the ſides of rills, &c. where they will produce larger lopping, and in leſs time than any other ſort of willow will do.

"If any gentleman, &c. have a mind to make plantations of this profitable tree, it would be well worth their while to lay out the ground in ſome gentle meander walks; which will be but little extraordinary expence, and in a few years will give both ſhade and ſhelter.

"This willow will make the moſt profitable coppice woods, to cut every ſix or eight years, for hop poles, and many other very uſeful purpoſes.

"They ſhould at firſt be planted about two feet and a half apart; and, after five or ſix years, three parts in four ſhould be dug up, and the remainder cut down within ſix or eight inches of the ground, to remain for ſtubs.

"This is alſo one of the beſt ſorts of willow for baſket-makers, as it grows freely, and is very tough.

"In many countries, where firing is ſcarce, this willow would turn to great advantage, merely for fuel; as it will grow into large billets in three or four years, and will burn very well both green and dry.

"Since I wrote this, a gentleman told me, that he knew of three willow trees being ſold for fifteen pounds but he could not inform me what kind they were; I fancy them to be the bright ſwallow-tail willow; for, next to the Norfolk kind, it is the largeſt growing ſor and beſt for moſt uſes."

Mr. North calls this the Norfolk willow; but that only a local name for this tree. It is by ſome call the Hertfordſhire willow, and has had various oth names in different places. The deſcription he has giv of the leaves, and the firm ſound texture of the woo without pith or ſap, will, however, ſufficiently aſcerta the ſpecies to thoſe who may not before know it. Whe he publiſhed this account, he adverti ſed, that he wou furniſh ſets to any who might want them. As he is ve lately dead, who may be his ſucceſſors in his buſineſs, whether they will continue to provide for the demand ſets, we are at preſent ignorant: but it would be a ma ter of regret, that the difficulty of procuring them, ſhou be any diſcouragement to thoſe who may be diſpoſed make plantations of this tree.

There is an addition, which might be made to M North's plan of deriving an intermediate profit from a plan tation of theſe trees, while the principal of them are grow ing to due maturity. It is this, to leave at the ſecon thinning one tree in the middle of every four, that are in tended to grow to maturity; which middle tree will con ſequently be at more than ſix feet diſtance from any othe being in the diagonal line of the four. The trees ſo le ſhould be then cut down, within ſix or eight inches of th ground, and ſuffered to ſhoot afterwards as ſtubs or pollard In which ſtate they will afford hop-poles, billets, twig for baſket-work, &c. if cut at proper periods, from ſeve years to every other year, reſpectively to the purpoſes, ſo which the ſhoots may be wanted. This kind of plantation of pollards, with tall trees, is not ſo proper in a dry, a in a moiſt ſituation; becauſe the crowding the roots may in dry ſeaſons, injure the growth of the trees intended t ſtand for wood, where there is a want of moiſture in th ground. But in a wet ſoil, it will rather aſſiſt than retar them; and will be a conſtant ſource of profit durin the whole continuance of the plantation.

Other trees may be treated in the ſame manner, al lowing for the reſpective differences of each, with ver great advantage, in ſwampy and marſhy ground, as i the low parts of meadows, or the waſte of manors; an the plantations will often prove a beauty and convenienc in other reſpects. In ſuch caſes the twenty ſhillings pe year allowed for rent in Mr. North's account may b wholly or moſtly ſaved.

WIND-GALL, a flatulent ſwelling which yields t the preſſure of the finger, and recovers its ſhape on th removal thereof: the tumor is viſible to the eye, an often ſeated on both ſides of the back ſinew, above th fetlocks, on the fore legs; but moſt frequently on th hind legs; though they are met with in various parts o the body, wherever membranes can be ſo ſeparated, tha a quantity of air and ſeroſities may be included withi their duplicatures.

When they appear near the joints and tendons, they ar generally cauſed by ſtrains, or bruiſes on the ſinews, or th ſheath that covers them; which by being overſtretched have ſome of their fibres ruptured; whence probably ma ooze out that fluid which is commonly found with the in cluded air: though where theſe ſwellings ſhew themſelve in the interſtices of large muſcles, which appear blown u like bladders, air alone is the chief fluid; and theſe ma ſafely be opened, and treated as a common wound.

On the firſt appearance of wind-galls, their cure ſhould be attempted by reſtringents and bandage; for which purpoſe let the ſwelling be bathed twice a day with vinegar, or verjuice alone, or let the part be fomented with a decoction of oak bark, pomegranate, and allum boiled in verjuice, binding over it, with a rowler, a woollen cloth ſoaked in the ſame. Some for this purpoſe uſe red wine lees, others curriers ſhavings wetted with the ſame, or vinegar, bracing the part up with a firm bandage.

If this method, after a proper trial, ſhould not be found to ſucceed, authors have adviſed the ſwelling to be pierced with an awl, or opened with a knife; but mild bliſtering has in general the preference given to theſe methods; the including fluids being thereby drawn off, the impacted air diſperſed, and the tumour gradually diminiſhed. A little of the bliſtering ointment ſhould be laid on every other day for a week, which brings on a plentiful diſcharge, but generally in a few days is dried up, when the horſe may be put to his uſual work, and the bliſtering ointment renewed in that manner once a month or oftener, as the horſe can be ſpared from buſineſs, till the cure is compleated. This is the only method to prevent ſcars, which firing of courſe leaves behind, and unleſs ſkilfully executed, too often likewiſe a fullneſs of the joint, with ſtiffneſs; the mild bliſtering ointment, where the ſublimate is left out, is the propereſt for this purpoſe. *Bartlet's Farriery, p.* 276.

WIND-ROW, the green parts, or borders of a field, dug up, in order to carry the earth on the land to mend it; ſo called becauſe it is laid in rows, and expoſed to the wind.

Wine, a general name given to any briſk, agreeable cordial liquor drawn from vegetable bodies and fermented, particularly that procured from the juice of the grape. *See the article* FERMENTATION.

One and the ſame kind of grape proves greatly different in taſte and flavour, according to the climate and expoſure to the ſun. In cold countries the vine, if it grows at all, never ripens its fruit; and even in France and Italy it is conſtantly obſerved, that the grapes produced on the ſouth ſides of hills are notably ſweeter than thoſe which grow on plain grounds. Among the Tockay wine-hills, there is but one which directly fronts the ſouth, and the advantage of its ſituation are not a little remarkable: from the extraordinary ſweetneſs of its grapes, it is called the ſugar hill. It affords the moſt delicious of all the Hungarian wines, and is appropriated to the uſe of the imperial family.

In very warm dry ſeaſons, the grapes at the bottom of the hills are beſt; in warm and moiſt ones, thoſe at the top; ſuch as grow in the mid region being always good. In dry ſummers, the grapes are ſweeteſt, but leaſt juicy: in rainy ones they abound with juice, which proves proportionably weaker and more dilute. Froſts in autumn promote their ripening; but froſts ſucceeding heavy rains makes them apt to burſt and ſhed their juice.

The grapes in America are remarkably apt to burſt; which Mr. Miller imputes, either to the too great moiſture of the air in that country, or to their receiving too much nouriſhment from its over rich ſoil. But gentlemen of America think that their air, except in marſhy places, is drier than ours; and are therefore of opinion, that the burſting of their grapes is not owing to the too great moiſture of the air. If it proceeds from too much nouriſhment, the remedy would ſeem to be eaſy, by training up a great number of branches to conſume that nouriſhment. Others, perhaps with more reaſon, impute their burſting to their ripening too early, while the heavy rains, frequent in autumn, continue to fall. In this caſe, they may be raiſed againſt lofty trees, as was the method of the ancient Romans, and as ſtill is the practice in many parts of Languedoc and Provence. The reflection of the heat from the earth would then be leſs, and the leaves of the trees would ſhelter the grapes from the ſun. By this means, being later before they fill, they would not be ſo apt to burſt; and as the latter end of the autumn is generally fair, they may then have an opportunity of coming to their full maturity, without the danger of burſting. Or if it be thought more adviſable to quicken their ripening, the warmeſt ſoil and ſituation ſhould be choſen for the vines, and they ſhould be kept low.

A due degree of maturity is eſſentially neceſſary in every kind of fruit, the juice of which is to be made into wine: becauſe the juice of unripe fruit is a rough acid liquor, which cannot be made to undergo a vinous fermentation, without great difficulty. In ſome inſtances, as in verjuice, it will remain in the ſame ſtate for years together. Nor is there leſs danger from the fruit's being over ripe; becauſe the leaſt taint or putrefaction will, as before obſerved, run through the whole proceſs of the wine, in ſpite of every art that can be uſed to correct or remove it.

When a conſiderable portion of the grapes have attained their full maturity, theſe ſhould be gathered with great ſkill and care, leaving the unripe for a future gathering. Moſt vintagers make it an almoſt general rule, to gather their grapes at a certain ſtated time, according to the cuſtom of the country, without attending to their various degrees of ripeneſs; therein imitating other ruſtics, who ſeldom vary their operations as the ſeaſons vary. Thus, in ſome countries they make it a general rule, to gather their grapes when dry; and in others they as carefully gather them when they are wet with dew. In both the circumſtances of the ſeaſons ſhould perhaps vary this cuſtom: for example, when a warm kindly ſeaſon has brought the grapes to a due maturity, ſuch juice wants no addition; and if, on the other hand, the dryneſs of the ſeaſon ſhould have thickened their juice too much, the dew may remedy that defect. If a cold or rainy ſeaſon has prevented their ripening thoroughly, and they ſtill continue in an acid watery ſtate, ſurely the warmeſt and drieſt hours ſhould be choſen for gathering them.

In ſome places the grape is concentrated or rendered richer by ſuffering it to remain on the tree till great part of its watery moiſture has exhaled; the ſtem of each cluſter being cut half through, when the fruit is ripe, to prevent the afflux of any freſh juice from the plant. The ſweet Hungarian and Spaniſh wines are made from grapes that have been thus half dried.

In order to make good wine, the grapes of the ſame vine ſhould be gathered at three different times. The firſt gathering ſhould conſiſt of the ripeſt, fineſt and moſt open bunches: they ſhould be cut as cloſe as poſſible to the fruit, the better to avoid the auſtere ſharpneſs and bitterneſs of the ſtalk, and all their rotten or green berries be carefully picked off, or rather cut off with a pair of ſharp ſciſſars. Some are even ſo nice as to cut off the grapes at the ends of the bunches, becauſe they are always weaker in quality, as well as leſs ripe, than thoſe which grow higher up on the ſtalk. By this means they indeed diminiſh the quantity of their wine; but what they do make,

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is thereby vaſtly improved. An inferior wine is, however, made of the grapes which are ſo cut off. This practice is, indeed, attended with ſome trouble; but it anſwers extremely well, and deſerves to be much recommended, as a means of obtaining at leaſt ſome good wine, in years when, and places where, the grapes do not ripen perfectly. The ſecond gathering ſhould be of the large, cloſe, and leſs ripe bunches; for cloſe bunches never ripen thoroughly: and the third will of courſe conſiſt of the refuſe of the former gatherings; but no rotten grapes ſhould ever be mixed with either. Each of theſe three cuttings ſhould be preſſed ſeparately. It is highly neceſſary always to employ a ſufficient number of gatherers, each of which ſhould be provided with a baſket and knife, and ſhould lay the bunches, as faſt as they are cut, gently in the baſkets, without bruiſing or ſqueezing them; for the more expeditiouſly they are gathered, the finer will be the colour of the wine; and the ſooner they are preſſed the better will be its quality. Women are moſt commonly employed for gathering the grapes, becauſe their labour is cheaper than that of men, and this does not require any great exertion of ſtrength.

This firſt work, which is of the utmoſt importance to the making of good wine, may be ſtill more completely performed by duly attending to the following circumſtance. The fruits of different vineyards are of different qualities: ſome, ſituated on very light and ſtoney land, yield exceedingly delicate and high flavoured wine, which ſeldom is ſtrong, whilſt the grapes of vines growing on a richer ſoil, where they receive more nouriſhment, afford a wine which has more body. Both theſe good qualities may be united in the ſame wine, either by mixing the grapes of the different growths before they are preſſed, or by mixing the different wines that have been obtained from them: but the ſureſt way is to mix the grapes, becauſe it is thought that theſe liquors do not eaſily incorporate perfectly after they are made: the weakeſt of them is ſaid to change its colour, and to communicate its defects to the other, inſtead of being mended by the ſuperior quality of that with which it is blended; ſo that, according to many who pretend to have had long experience in theſe matters, the leaſt evil, and that leaſt is a very great one, which can ariſe from thence, is a cloudineſs in the liquor, a ſort of floating lees which will always tarniſh the beauty of its colour, ſpoil the perfection of its taſte, and prevent its ever becoming perfectly bright. This does not happen when the perfect grapes of one vineyard are mixed with the perfect grapes of another: for, from the juices of theſe different fruits preſſed out and fermented together, proceeds an exquiſite, ſound, delicate, fragrant, and bright coloured liquor, which will keep ſeveral years without the leaſt alteration. It is by a knowledge of the good effects produced by a judicious mixture of the grapes of three or four vineyards of different qualities, that the celebrated Champagne wines of Saleri, Aï, and Hautvilliers, have been brought to the perfection for which they are ſo famed. Every thing that can delight the palate ſeems to be united in them. But this knowledge can be acquired only by many repeated trials, and long experience.

One of the ways of making wine in the higheſt perfection of which it is ſuſceptible, is to ſtrip the grapes from off their ſtalks before they are thrown into the vat. By this means all the auſtere roughneſs which the ſtalks would communicate to the liquor is guarded againſt, and the muſt may be ſuffered to ferment, without danger, till the fermentation has ſufficiently opened the body of the fruit. The wine which is thus obtained is the melloweſt, beſt coloured, foundeſt, and fitteſt for keeping.

The above directions for gathering and ſorting the grapes are equally proper, whether white wine is to be made, or red; for either of theſe differently coloured wines may be, and generally is, obtained from the ſame grapes, that is to ſay from black ones. As to the white wine which white grapes yield, it ſeldom has much ſtrength or flavour, ſoon grows yellow, and for want of body, rarely keeps well even till the next ſummer. All the white wines of Champagne, which look as bright and as clear as chryſtal, are made from the blackeſt grapes, and never preſerve their colour better than when all the plants of white grapes have been rooted out of the vineyard. Formerly the wine of Ai would hardly keep a year; the thin ſweet juice of the white grapes, of which the quantity was great in the vineyards of that diſtrict, turning yellow, gained the aſcendant, and altered the whole maſs of the wine. But ſince white grapes have been no longer uſed in the white Champagne wines, that of the mountain of Rheims laſts ſeven or eight years, and that of the river Marne keeps well for four or five.

The wine of black grapes may be made of almoſt any depth of colour that one pleaſes. They who deſire to have it perfectly white, proceed thus. The gatherers go into the vineyard very early in the moning, and ſelect the fineſt bunches, which they cut as cloſe as poſſible to the fruit, then lay them gently in their ſmall hand baſkets, and when theſe begin to be full, put them, ſtill as gently as can be, into panniers, commonly called dorſers, in which men or women carry them, with the greateſt care not to tumble or bruiſe them in the leaſt, to the end of the vineyard, where they are put carefully into large panniers, with all their bloom, or azure, as it is technically termed, and all the dew upon them. This dew increaſes greatly the quantity of the wine: but at the ſame time it weakens it conſiderably.

If the ſun begins to be a little powerful, the vintagers ſpread wet cloths over the baſkets, whether dorſers or panniers; becauſe, if the grapes ſhould be heated, the liquor drawn from them would be apt to contract a reddiſh teint. If the place where they are to be preſſed is not far from the vineyard, men or women carry the dorſers gently on their backs to the preſs; but if the diſtance is conſiderable, the panniers, into which the grapes are in that caſe put, are loaded upon quiet eaſy-going beaſts, which carry them ſlowly, and without ſhaking, to the cellar, where they remain covered and cool. When the heat of the ſun is but moderate, the vintagers continue their work ſafely till eleven o'clock: but when it ſhines ſtrongly, they leave off at nine.

For the making of white wine, of which we now ſpeak, the grapes are thrown, as faſt as the panniers arrive with them, not into the vat, as would be done for red wine, but into the preſs, of whatever form it be, and the firſt preſſing is given immediately. The wine which runs from this preſſing is the moſt delicate of any. The French call it *vin de goutte*, becauſe it rather drops than runs, as but little force is uſed in preſſing it. After this firſt preſſing, which is but gentle, for fear of diſcolouring the liquor, the preſs is raiſed, the ſcattered grapes are thrown up upon the cake, and the ſecond preſſing, called the turning

ing up (*la retrouſſe*) is given. Here the preſs is ſcrewed down with much greater force than before, and if this ſecond running is not quite ſo plentiful as the firſt, though it ſometimes is more ſo, it is at leaſt but little inferior to it in flavour or colour, and preferable in this, that it has a ſtronger body, and will keep a conſiderable longer time. The wine of the firſt preſſing is, however, always ſet apart, if it has been drawn from quite ripe grapes and in very warm weather; becauſe the juice of the fruit then runs very plentifully, and there might be danger of reddening it by mixing it with that of the ſecond preſſing: but this mixing of them is uſeful, and ſometimes neceſſary, on account of the greater ſtrength of the ſecond running when the year is not a warm one, aud when the firſt preſſing has not yielded plentifully.

After the two firſt preſſings, the ſides of the cake of grapes are cut down perpendicularly, with a ſteel ſpade, ſo far as they exceed the breadth of the upper part of the preſs which is let down upon the fruit; the grapes thereby ſeparated are thrown up on the top of the cake; and the third preſſing, commonly called the firſt cutting, is given. The juices of this firſt cutting are excellent, to make a perfect liquor; and they may alſo be added to the red wine, if any of this is made ſeparately. A fourth preſſing, a fifth, and ſo on of others, which are called the ſecond, third, and fourth cutting, are given after this; the ſides of the cake being cut down and thrown up each time, till the grapes ceaſe to yield any more juice. The liquor of the cuttings becomes gradually more and more red, becauſe the action of the preſs becomes more and more forcible upon the thin ſkin which envelops the berry, and the particles detached from thence are what render the wine red. Sometimes too the heat of the ſun, or the ſhaking of the fruit in the carriage, are ſo great, and act ſo powerfully upon the outſide of the grapes, that the tinging particles which are in the ſkin of the berries, being let looſe, mix immediately with the juice of the grape at the very firſt preſſing, and then a perfectly white wine cannot be made; but it will be the colour of a patridge's eye, or even deeper. The wine itſelf is not, in fact, at all the worſe for this: but the faſhion is to have it either perfectly white, or of a full bright red.

The wines of theſe different cuttings (as the latter preſſings are called) are collected ſeparately, and afterwards mixed according as they contain more or leſs of the quality that is wanted. Thoſe who have many grapes preſs them at two, three, or even four different times, and collect each of the runnings ſeparately. For the firſt they conſtantly chooſe the moſt perfect grapes, and this wine is always worth a third part more than the ſecond, and ſo on in proportion.

It is eſſential to obſerve that the preſſings for white wine, if it be wiſhed to have it very pale, ſhould be performed as quick as poſſible one after the other, in order that the grapes may not have time to heat, nor the liquor remain long upon the murk. Particular attention ſhould be paid to this for the two firſt runnings, becauſe they yield the fineſt wine.

Of the ſame black grapes, namely the black morillons, the pineaus, and the Avernats, with which we have ſeen that white wine is made in Champagne, red wine is made in Burgunny; and indeed the ſame has, of late years, been attempted alſo in Champagne, with no bad ſucceſs; though not ſo as by any means to equal the fine white wines of that country, or the beſt red wines of Burgundy.

As much as the heat of the ſun is avoided by the vintagers who make white wine, ſo much it is ſought after and wiſhed for by thoſe who make red wine. Theſe always chooſe to gather their grapes when the ſun ſhines hotteſt; becauſe they find that its action upon the outſide of the berries produces more effect than ſeveral days ſteeping in the vat would do; for that the grapes then ferment very ſpeedily. As to the reſt, the cautions before directed for gathering the grapes for white wine, in regard to their ripeneſs, the ſorting of them, cutting the bunches off with as ſhort ſtalks as poſſible, clearing them of all damaged, rotten, and unripe berries, &c. ſhould be equally obſerved here. Some expreſs the juice of theſe grapes in the open air, either in the vineyard itſelf or cloſe to it, by throwing the bunches into large tubs, and there maſhing or bruiſing them to pieces, with ſticks, or by putting children into the tubs to tread out their juice. Others carry them home, with care not to bruiſe them by the way, and put them in a vat, in which they are trodden and maſhed. This, in either of theſe caſes, is repeated till the veſſel is full; and after that the broken grapes are let lie in their liquor more or leſs time, according to the heat of the weather, the flavour of the muſt, and the degree of colour that is intended to be given to the wine. During this time, the whole muſt be frequently ſtirred together, the better to raiſe a fermentation, and tinge the liquor with a due degree of red; for it is known by experience, that the redneſs of wine proceeds from the more or leſs intimate mixture of the colouring which is in the ſkin of the grape, with the juice which is contained in the pulpy body of the berry. It is, in fact, chiefly to give this dye to the wine, that the trodden grapes are let lie to ferment in the tub or vat before they are preſſed.

Some adviſe, as a general rule for all red wine, to let the grapes lie in their liquor forty-eight hours; whilſt others, going on in the beaten track of their forefathers, without daring even to ſuſpect that there may poſſibly be errors in the ſtated practice of their country, talk of letting the grapes infuſe during ſeven or eight days, or even longer, and act accordingly: but the authors of the Maiſons Ruſtique, who ſeem to have taken their directions from more judicious and more accurate obſervations, ſay poſitively, that the duration of this infuſion of the huſks ſhould be proportioned, not only to the heat of the weather, but alſo to the natural quality of the grapes, and to the uſual, or intended colour of the wine that is to be made. Thus, for the Coulange wine, which is one of the moſt eſteemed growths of Burgundy, only four hours, or at moſt five, are allowed for the ſteeping of the huſks, unleſs the weather be chilly and rainy; in which caſe they are ſometimes ſuffered to remain all night in the liquor. This is likewiſe, now, the practiſe of the beſt vintagers throughout the whole province of Burgundy, in moſt parts of that of Orleans, and, in ſhort, in almoſt every part of France where the fineſt, higheſt flavoured, and moſt ſpirituous red wines are made: and the reaſons for it are, that this time is found to be ſufficient to give the wine a duly deep colour; that it is apt to contract a roughneſs from the ſtalks if it remains too long upon them (to guard againſt which, as much as can be, care is taken to pull the ſtalks out with the rake or ſtick, with which the muſt is ſtirred in the tubs or vat, whilſt others, more cautious, pick the grapes from off them before it is trodden out): and alſo, becauſe too much fermenting of the muſt always renders the wine harſh and coarſe, deprives it of its moſt volatile parts, and the quantity of the muſt is conſidera-

bly diminiſhed by the loſs of what flies off, or is otherwiſe waſted in the fermentation. Others again make it a rule not to draw off their muſt till its head begins to fall. But in this they are evidently wrong; becauſe a great part of the moſt active ſpirits of the liquor is certainly evaporated thereby. It may indeed be true, and probably is, that the liquor which has lain long upon the murk acquires the moſt ſtrength, and is therefore fitteſt for keeping: but at the ſame time it alſo acquires a roughneſs and bitterneſs of taſte, communicated from the ſtones and ſtalks of the grapes, which are far from rendering it the more palatable.

Might not the ſureſt way of judging when the liquor has lain a ſufficient time upon the bruiſed grapes be, to thruſt one's hand pretty deep into the vat, to take from thence a handful of the murk, and to ſmell to it, as the dyers do, to judge of the diſpoſition of their vats? One might then, perhaps, eſpecially with the help of ſome experience, know pretty exactly whether the liquor be ſufficiently concocted, and whether it has acquired colour enough. If it ſmells ſweet, it ſhould be let work a little longer in the vat; at leaſt till it has loſt that ſmell, and has acquired ſo ſtrong a ſcent as to affect the noſe. Then may probably be the right time for drawing it off. A good bodied wine will never taſte of the grape ſtone, if it be taken in its proper degree of the vat: but it will keep ſound for many years, and be always fit to drink.

To the different ways of managing the muſt is certainly owing, in a great meaſure at leaſt, that ſome people make much better wine than others from grapes of the very ſame ſort, of equal ripeneſs, and of the growth of equally good and well ſituated vineyards. Indeed, for thicker, heavier, and coarſer wines, than thoſe of either Burgundy or Orleans, of which, chiefly, we have now been ſpeaking; ſuch, for example, as the Bordeaux claret, of which we are ſo fond in this country, and of which the French themſelves do not drink at home, a whole day is frequently allowed for the ſteeping of the huſks, and ſometimes more, before the preſs is recurred to. But as to the rule of letting the grapes lie to ſteep in their liquor forty-eight hours, and much leſs the longer time which ſome recommend and practiſe, we cannot, for the above reaſons, think it properly applicable to any ſort of wine, unleſs it may, perhaps, be in very cold unfavourable weather, or for ſuch thick, heavy, dark coloured, and very heady wines, as thoſe of Oporto, which, as is well known, are ſcarcely drinkable even here, till age has depurated them and ſoftened their natural roughneſs. It is true, that wine which has fermented long upon the murk may always be beſt for keeping; but it will never be the moſt pleaſing to drink.

We conſequently do not approve of this part of the method of making red wine in Chianti, from whence we may probably judge of the general practice in Italy. When the grapes there are of a due ripeneſs, and the weather warm and dry, they are cut as ſoon as the ſun or wind has dried up the dew that was on them, and are put into little barrels, commonly called piggins, in which they are carried to the wine vat, on mules if it be diſtant, but between two men if it be near. They are then bruiſed to maſh in thoſe barrels with a club, and thrown directly into the vat, or elſe into a kind of very large hopper placed over the vat, with a grate lengthwiſe, through which the juice, huſks, ſtones, and ſtalks all paſs into the vat, upon their being trodden; and this is continued till the vat is full: when immediately, or ſometimes even hours before it is full, the muſt thus made ferments. By this means the huſks, ſtalks, and ſtones are thrown up to the top of the liquor, where they form a thick cruſt; and this ebullition, which will continue for many days if the liquor be ſtrong, for its duration depends on the ſtrength of the muſt as well as on the temperature of the air, is ſuffered to proceed till the wine is judged to be fit for drawing off. This fitneſs is determined by the palate; and herein conſiſts the greateſt ſkill in the art of making wine. Old practitioners know preciſely, by the colour, ſmell, and taſte of the muſt, the exact time that beſt ſuits their method of proceeding: but it cannot be learnt without great attention, and long experience. The wines of the plains are generally deemed ready for tunning in about ten days, thoſe of the Hills in about fifteen, and thoſe of the mountains in Chianti in about eighteen or twenty, or ſometimes more; for in this way of proceeding, the weather has always a very great influence on the ripening of the muſt. When it is judged to be near ready for turning, thoſe who are ſkilled in thoſe matters taſte it every eight hours. The longer the ebullition is contiuned, the drier and deeper coloured will the wine be: and the leſs it is continued, the ſweeter and paler will be the liquor.

The vats are proportioned to the quantity of wine that is to be made at one preſſing, and there frequently are ſeveral of them in the ſame vineyard; for the Italians preſs all their red grapes in the open air. The vats on which the hoppers are ſet are covered with boards, and a coarſe linen cloth, the better to prevent the evaporating of the wine, and other accidents.

When the Italians make their ſtrong white wines, or muſcadines, they gather their grapes carefully, and lay them in the ſun for three or four days, or more; always houſing them at night, or at leaſt covering them, ſo that no dew may fall on them. They call the ebullition which theſe undergo in the vat a ſhort one, becauſe it does not exceed five or ſix days; after which they tun up the wine, and ſhift it twice or thrice from one caſk to another, to make it become fine. As to the Verdea or white Florence, as it is called, they draw it off from the vat almoſt as ſoon as an ebullition begins to riſe in it, and has thrown up the huſks, ſtones, &c. ſo as to form a cruſt at top. They then let the ebullition continue for a day and a half, or at moſt two days, in the caſk into which it has been drawn, from which they afterwards ſhift it into another, and in a few hours more into a third and fourth, to check and prevent the fermentation. By this means it is made to retain that ſweetneſs which the ladies in moſt countries are fond of: but wine thus managed never is perfectly fine.

When the muſt has fermented upon the huſks of the grapes in the tubs, or vats, as long as is thought proper, it is poured off from the former into other veſſels, and drawn off from the latter by means of a braſs cock placed about three or four inches above the bottom of the vat, from whence it runs into a receiver, which, as well as that under the preſs, generally is a very large caſk, open at one end, and placed upright directly underneath the cock or channel through which the liquor flows. A bundle of pretty cloſe tied twigs, commonly of vine cuttings, or of the haulm of aſparagus run up to ſeed, is placed within the vat, before the grapes are put into it to be trodden, cloſe to the entrance of the cock, to prevent the huſks from running into it ſo as to choak it up; and a large ſtone or two is laid upon this bundle, to keep it down. Beſides this precaution to retain the huſks, &c. of the grapes, and prevent their mixing with the liquor that is

is drawn off, ſome, for greater ſecurity, let their muſt run from the cock through a ſieve, into the receiver, from whence (as alſo from the above-mentioned tubs, in the uſing of which the ſame precaution of keeping back the huſks, &c. is carefully obſerved when the liquor is poured out of one into another) it is laded by hand, in bowls, jugs, jets, or pails, and poured into the caſks, through pewter funnels.

After the muſt has been thus poured or drawn off, the murk, that is to ſay, the remainder of the grapes at the bottom of the tubs or vat, is collected together and put into the preſs, where it is ſqueezed very hard, three or four times, in ſhort, till it is perfectly dry, its ſides being cut down each time, and thrown up, as before directed for the latter preſſings of the grapes; and the liquor obtained from thence, eſpecially if the preſs be ſcrewed ſo tight as to crack the ſeeds of the grapes, has a ſtronger body than any of the preceding runnings, but not any part of their fine, high, or delicate flavour. Some, however, mix a little of it with their other wines, to ſtrengthen them, and thereby make them keep the better: but certainly not to mend their taſte.

Others, in whom the ſpirit of œconomy is very prevalent, pour as much water as they think proper upon the murk in the vat, immediately after the muſt has been drawn off. They do this immediately, for fear of the murk's turning ſour, as it would be very apt to do, if they ſhould wait longer. They then ſtir it about, and leave it upon the murk a longer or ſhorter time, according to the heat of the weather, till they find it pretty highly coloured, and judge that it has incorporated all the remaining particles and ſpirit of the wine. They then draw this water off into another veſſel, and carry the remaining murk to the preſs, where they ſqueeze it till not a drop of moiſture remains in it. The liquor thus extracted is mixed with that which was drawn off before, and is then barrelled. This is principally intended for common uſe, or rather for ſervants: but it muſt be drank in the enſuing winter; for it will turn ſour by the next ſummer. It is briſk and pleaſant enough whilſt it laſts good, and is much preferable to water cyder; though not equal to the refuſe wine, as it is called, of which a vat, or more, is generally made by itſelf, of the damaged, rotten, or unripe black grapes that were left at the laſt gathering, as not being fit for the finer wines.

Another uſe too which the French make of the murk of their grapes after the muſt has been drawn off from the vat, is, to amend ſuch of their wines, whether red or white, old or new, as are deficient in colour or ſtrength. To this end they empty them out of their caſks into the vat, immediately after the muſt has been drawn off, ſtir the murk up ſo as to mix it thoroughly with them, and then let them remain upon it, at moſt twenty-four hours if it be new wine, and twelve hours if it be old. When they find that it has taken a ſufficient degree of colour, and that it is not ſweet to the taſte, but agreeable to drink, they draw it off, barrel it up ſeparately, in order to know it again, and then put the remaining murk in the preſs, where it is ſqueezed as dry as poſſible.

As to the white grapes that were rejected at the former gatherings, they are let hang upon the vines till the latter end of October or beginning of November, that they may be a little bitten by the froſt. They are then gathered, and a wine is made of them which is ſold quite warm from the vat, and does well enough to mix with coarſe red wine.

The newly preſſed murk of grapes ſoon contracts a heat; and as it contains many ſpirituous parts, it is then uſed as an effectual remedy for rheumatic pains, ſtiffneſs of the joints, and numbneſs of the limbs. The way of applying it is, to bury the part affected under a heap of fermenting murk.

By the time that the murk has undergone the utmoſt dint of preſſing, it will be as hard as a ſtone: but even then it will yield, when diluted with water, fermented, and diſtilled, a ſpirit which has its medicinal, as well as domeſtic, uſes. Or it makes a good manure for land; particularly, ſay ſome, for vines and for aſparagus.

The too great propenſity to fermentation in hot countries has laid the inhabitants of thoſe parts under the neceſſity of uſing means to retard it: but the method which they practiſe for this purpoſe renders their wines, as Dr. Neuman juſtly obſerves, ſcarcely deſerving of that name; becauſe they hardly undergo any degree of fermentation at all, and are, in fact, no better than boiled muſt. Several of the Italian wines are of this ſort, and are called by the general name of, *vino cotto*, "boiled wine." It is to thin watery juices, extremely prone to ferment, and in which fermentation, when once begun, can ſcarcely be ſuppreſſed till it has run beyond the vinous ſtate, that the proceſs of boiling over a fire is applied. The fermentative quality is thereby reſtrained, and the liquor becomes richer, and continues fit for drinking at leaſt a year or two, though it is never ſo wholſome as the fermented wines. The effects of muſt and of wine upon animal bodies are diametrically oppoſite: for muſt relaxes and liquefies, and, if drank immoderately, is apt to produce dangerous fluxes, whereas perfect wine, on the contrary, corroborates and conſtringes. This the doctor reckons the firſt of three claſſes into which he very properly divides wine, with reſpect to its fermentation.

The ſecond claſs comprehends thoſe wines which have undergone fermentation, but not a compleat one. Of theſe there are two kinds. The firſt is the thin ſweet wines; which are no other than muſt partially fermented, or whoſe fermentation is checked, while it can be checked, before the ſweetneſs has gone off. Theſe wines can ſcarcely be kept above a year. Such as the Tyrol, ſome of the Savoy, and ſeveral of the Italian. The ſecond ſort is the ſtrong, full-bodied, rich, ſweet wines, which are generally a mixture of fermented and inſpiſſated muſt; the latter being added to increaſe the richneſs of the liquor, and prevent the fermentation from running beyond its due limits. Theſe kinds of wines greatly heat the conſtitution, and ought to be very ſparingly drank: ſuch are Malmſey, Canary, and ſome of the Spaniſh and Hungarian wines.

To the third claſs belong thoſe wines which have been completely fermented, and have thrown off their groſs matter. Theſe are the moſt perfect wines, and for common uſe the moſt wholſome.

In cold countries, where, for want of the ſun's having force enough to mellow and enrich the juice of the grape the muſt is thin and poor; ſugar, or dried grapes, ſhould be added to the muſt, to give it a body. Authors name a variety of other ingredients for this purpoſe; but they are uſeful only as they contain a ſaccharine ſubſtance. It is therefore moſt adviſable to uſe good ſugar, which requires no other care than diſſolving it in the juice in the proportion deſired, or found to be wanted. If part of the juice is evaporated by fire, as is ſometimes practiſed, a ferment muſt be added, to make up for the inaptitude to ferment, which experience has ſhewn to be in all juices that have been boiled.

When we here adviſe the adding of ſugar, in particular, we do it on a ſuppoſition of its being the ſubſtance moſt eaſily come at; and alſo becauſe it has been proved by ſome late experimenis, that all juices are more or leſs fermentable in proportion to the quantity of ſaccharine matter contained in them.

If the juice is ſo ſour that it will not ferment kindly, no alkaline ſalts ſhould be recurred to, though greatly recommended by ſeveral authors; becauſe they raiſe ſo ſtrong an effervеſcene, that they deprive the liquor of much of its moſt volatile and active principles, and thereby leave it vapid. Inſtead of theſe, ſuch calcarious ſubſtances as will give the leaſt taſte to the liquor, or diſſolve the leaſt in it, ſhould be preferred. Such are, extremely well cleaned oyſter or other ſhells, and hard lime-ſtone or marble reduced to powder. Theſe ſhould not be calcined or burnt; becauſe they would then communicate a diſagreeable taſte to the liquor, and be beſides attended with the diſadvantage of raiſing too great an effervеſcence. Next to theſe, chalk bids the faireſt to anſwer the deſired end. But a caution neceſſary to be obſerved when theſe or any other ſuch like ſubſtances are uſed, is, that the too great acidity of the liquor ſhould be only leſſened; for a certain degree of acidity is eſſentially neceſſary in all wines. If the juice is otherwiſe rich in ſubſtance, and faulty only in being too acid, warmth alone has, in many inſtances, been found to be a ſufficient cure. Madeira, for example, is always harſh, till it has been mellowed by heat: and thus again, ſome gentlemen in England and America, when the juice of their grapes has not fermented kindly, have obtained a very good wine by expoſing the containing veſſels, in a warm ſituation, to the ſun, with an intention of turning it to vinegar. Chemiſts know that all vegetable acids are volatile in certain degrees of heat; and it is highly probable that the effect of this ſummer expoſure may be the evaporation of the acid, and thereby the converſion of the whole into a mild vinous fluid. Inſtances are not wanting, of the rougheſt verjuice being turned to a ſtrong pleaſant cider, or vinous fluid, by means of a warm ſituation accidentally given it. Habit has made a gently acid even deſirable in ſome wines, as in Rheniſh.

In ſeveral parts of Germany where the grapes ſeldom come to full maturity, and are therefore gathered ſomewhat green, the makers of wine have iron ſtoves in their cellars, and keep in them a conſtant fire, at leaſt during the time of fermentation. This, by heightening the fermentation, ripens and meliorates the wines, and renders them much more palatable and agreeable than they would otherwiſe be. We have already ſeen that keeping the wines in places conſiderably warmed either by the ſun, or by fire, will have the ſame effect, even ſo late as in the ſummer after the vintage: for acid liquors remain long without either fermenting thoroughly, or putrefying.

As the wines drawn from the laſt gathering of the grapes cannot be ſo perfect as the others, for want of due maturity in the fruit, the people of Champagne and Burgundy have recourſe to the following method, to accelerate their ripening.

When the wines have been about three weeks in the caſks, and have been drawn off their firſt lees, they roll them up and down for ſome time, five or ſix times a day, for four or five days running; then two or three times a day, for three or four days; and afterwards twice a day, for about four days; then once a day for about a week; and after that, once in four or five days. If the grapes were gathered very green, the rolling in this manner is continued, in all, for about five or ſix weeks: but if they were tolerably ripe when gathered, rolling once in four or five days, for about a month or ſix weeks, is found to be ſufficient. This rolling of the liquor in the caſks is intended to ſupply the defect of its firſt fermentation.

It now appears evidently, from the foregoing account of the practice of making wines in hot and cold countries, that a means to counteract the inconveniencies of the climate is wanting in each. If they had proper cellars and vaults, as before obſerved, the too quick and too great fermentation in hot countries might be reſtrained and kept within due bounds; and a proper degree of heat during the fermentation in a cold country, might give the juice that rich mellowneſs which the too weak ſun could not.

The new wines will generally ferment of themſelves, within a few days after they have been put into the caſks. Thoſe that do not ſhould be helped, by putting into them a little of the froth, or yeaſt, which works from the others. The fineſt wines will ferment the ſooneſt: and this fermentation will continue for about ten or twelve days, according to the ſort of wine, and the ſeaſon of the year.

While the wine ferments, the bung-hole of the caſk muſt be left open, or only covered with a thin linen cloth, to prevent any dirt from falling in: and this cloth ſhould be laid hollow, ſo that the froth ariſing from the fermentation may have room to work off.

When the fermentation is pretty well over, which is known by the froth's ceaſing to riſe ſo faſt as before, the bung may be cloſed down, after filling up the caſk with liquor to within two inches of the top; and a vent-hole ſhould then be opened and left, to carry off whatever may be thrown up by any ſubſequent fermentation. This filling up of the caſk to within two inches of the vent-hole ſhould be regularly performed every two days, for about ten or twelve days running: for the fermentation will continue a conſiderable time, though in a leſs degree; and if the caſks are not kept ſo full as that the foulneſs thrown up by the fermentation may be carried off at the vent-hole it will fall back again into the wine, and prevent its becoming clear. After filling up each caſk in this manner to within two inches of the bung, for about ten or twelve days, it muſt be filled up to within an inch every fifth or ſixth day, for the ſpace of a month; after which, once a fortnight will be ſufficient during the next three months.

Though the fermentation will be over long before this laſt mentioned time, yet the caſks muſt be filled up once a month ſo long as they remain in the cellar: for as the wine will waſte inſenſibly in them, it will grow flat and heavy, if they are not kept conſtantly filled up. It were needleſs to ſay, that the vent-holes muſt be ſtopped when the fermentation is over.

About the middle of December, the wines may be drawn off from their lees into freſh caſks, for the firſt time; taking care to fill the caſks up and to place them ſo that they may not be ſhaken or diſturbed until the middle of February, when it will be right to draw them off again into other caſks. If the quantity of lees is then found to be ſo conſiderable as to endanger their contracting a putrid taint by remaining too long mixed with the wine, it may be adviſeable to draw it off again after a proper interval of time; or ſometimes it may be neceſſary to repeat this racking even more frequently, though hardly ſo often as is practiſed in Champagne, viz. even twelve or thirteen times in the ſpace of four years; becauſe, though this may render the wine very clear, bright, and pleaſing to the

the eye, it muſt ſurely diminiſh its ſtrength, and conſequently make it be the leſs fit for keeping.

A leathern pipe, about ſix or ſeven inches in circumference, well ſewed with a double ſeam, to prevent the wine's running out, is, at the diſtance of every five or ſix feet, very tightly bound with ſtrong waxed twine around braſs rings of the ſame dimenſions, made to ſcrew into other rings faſtened in the ſame manner to other ſimilar pipes. The number of theſe pipes may be ſuited to whatever diſtance is found proper or neceſſary: or, when the diſtance between the caſks is always nearly the ſame, the leathern pipe may be made of one ſingle piece, with only a braſs ſcrew-ring at each of its ends. To theſe ſcrews the extremities of the leathern pipe ſhould be fitted, ſo as to ſcrew exactly on or into them, two braſs ſtrong cocks, which are however firſt to be thruſt as lightly as poſſible, by their more taper ends, the one into the uſual tapping place of the caſk which is to be emptied, and the other into the uſual tapping place of that which is to be filled; that is to ſay, each of theſe cocks is to be firmly and cloſely fixed at about two or three inches above the loweſt part of the head of the caſk to which it is applied. It were needleſs to obſerve that theſe cocks muſt be quite ſtrait, the better to complete the communication from one caſk to the other. When every thing is thus prepared, the cocks being duly fixed in their reſpective caſks, are both opened, and the wine then flows naturally from the full caſks into the empty one, till the liquor becomes of an equal height in each, without in the leaſt diſturbing the lees of the wine in the caſk that is to be emptied. When the wine ceaſes to run ſpontaneouſly, the reſt of it is forced out by means of bellows conſtructed as follows.

Theſe bellows are about three feet long, and a foot and a half broad at their wideſt part. They are made and ſhaped in the common manner to within about four inches of their ſmaller end, from whence the remainder of them is but three or four inches wide. In the inſide of the place where their breadth is thus altered, the air paſſes through a hole of an inch bore; and upon this hole on the ſide of it that is next the nozzle of the bellows, is a piece of leather, like the valve of a pump, ſo fitted that when the bellows are lifted up to take in freſh air, that valve inſtantly cloſes upon the hole, in ſuch manner that none of the air which has paſſed through this hole, and entered into the caſk, can be drawn back again; but the bellows take in freſh air, by their holes below.

Inſtead of ending with a ſtrait nozzle like other bellows, theſe terminate in a tube or pipe of wood, a foot long, cloſely jointed into their ſmaller end, and there well glued and ſtrongly faſtened by good pegs, in a direction perpendicular to that of the body of the bellows, in order to its conducting the air downward. This nozzle, for ſuch we ſhall now call it in compliance to cuſtom, is round, and about nine or ten inches in circumference over its outſide at the top, from whence it diminiſhes gradually towards its other end, the better to fit it for entering ſome inches in at the bung-hole of the veſſel, and alſo to cloſe up that hole ſo exactly, that no air may get in, or come out, at its ſides. The upper part of this nozzle riſes about two inches above the level of the ſmall end of the bellows, and is there cut ſomewhat flat, that it may be the more eaſily ſtruck with a wooden mallet, and thereby forced the cloſer into the bung-hole of the caſk: and alſo at about two fingers breadth below the upper part of this nozzle, is nailed an iron ring, thro' which is paſſed an iron hook or brace, a foot long, by means whereof the bellows are cramped down to the hoops of the caſk: for without this precaution, the force of the air would drive the bellows out of the bung-hole, and the operation of emptying the broached veſſel would not be performed.

It is now eaſy to conceive the manner in which theſe bellows force the remaining wine out of the caſk that is to be emptied: for, upon opening the bellows, the air ruſhes in at the holes in their bottom; and upon ſhutting them, it is forced through their nozzle into the caſk: the valve juſt above their nozzle prevents its returning back; and thus a quantity of air ſufficient to counter-act the weight of the atmoſphere on the wine in the caſk that is to be filled, is eaſily forced into that which is to be emptied.

When the wine is drawn off to within about two or three gallons, a hiſſing is heard in the cock of the then almoſt empty caſk. The cock in the other ſhould then be turned, ſo as to cloſe it, and the pipe of communication ſhould be taken away. That done, all the remaining clear wine is drawn off from the caſk that is to be emptied, but with great care to ſtop when it becomes in the leaſt cloudy. This bright wine is then poured into the bung-hole of the caſk that is to be filled, and the entire filling of it up is completed with ſound wine of the ſame quality as that which has been drawn off. It is then cloſely bunged down; and when this has been done, the cock may be taken out and a plug put in, with very little loſs of wine. Or, if the owner be ſo curious as to deſire not to loſe any of his liquor, the little air neceſſarily left near the bung-hale may be drawn off with a ſmall hand-air-pump, and then ſcarcely a drop of wine will run out when the cock is drawn.

At every racking of this kind a peg-hole is made in the caſk, if there be not one before, in order to examine the degree of waſting of the wine: for wine waſtes ſenſibly in keeping, how cloſely ſoever the caſk be ſtopped; a part of it tranſpiring through the pores of the wood: but as Dr. Neumann obſerves, it is not the ſpirituous, but the watery part that is thus loſt; for the remaining wine proves ſtronger than at firſt, and the ſtrength continues to increaſe as the quantity diminiſhes. In filling up the veſſels, for it is neceſſary that they ſhould be kept full, care muſt be taken never to mix wines of diſſimilar qualities.

The Hungarian, for example, does not well bear any other wine, particularly Rheniſh: for if the ſpontaneous diminution of a caſk of Hungarian wine be made up with rheniſh, though both of them keep extremely well by themſelves, the mixture will preſently ſpoil: and ſo it is of other wines.

The lees in the ſeveral caſks that have been racked off may be collected together, and when their thicker part has ſubſided, a ſpirit may be drawn from the thinner.

Diſtempers ſeldom happen to fermented liquors, but from ſome fault in the manner of managing them. If the fermentation has been duly carried on, the wine racked off the lees before they can contract a putrid taint, and afterwards kept in an equal degree of heat, the wine will anſwer the expectation of the maker. When it is to be tranſported, and thereby neceſſarily brought into a warmer air, brandy is often added, to check the propenſity to a new fermentation. This is alſo ſometimes done to give ſtrength to the wine: but it is not a practice by any means to be recommended.

It is neceſſary for the preſervation of ſome wines, particularly of ſuch as are apt to be frequently on the fret, to fumigate the caſks with burning brimſtone, to which ſome add, perhaps uſeleſsly, vinous ſpirits and aromatic ingredients. The fumes of brimſtone ſtrongly reſiſt fermentation, but wines which are largely impregnated with them cannot be recommended as wholeſome. The colour of red wine is deſtroyed by them. What is called ſtum, is no other than muſt whoſe fermentation has been prevented, or prematurely ſuppreſſed, by fumigation with ſulphur.

The colour of wine is frequently artificial. A pale yellow may be natural, but a fine deep yellow proceeds from an addition of burnt-ſugar, or other colouring matters, or from the oaken caſk in which the wine has been kept. Wine may be naturally of a pale dilute red; but a deep red is almoſt always the effect of artificial additions, as of the red-woods, elder-berries, bilberries, &c. In France, no ſecret is made of theſe practices, the colouring matters being publicly thrown out after they have been uſed. Turbid wines are fined by a mixture of whites and ſhells of eggs, powdered alabaſter, and iſinglaſs. The uſe of the ſhells and alabaſter is to correct any ſmall degree of acidity that the wine may have contracted: and indeed if we look into the many compoſitions made uſe of by vintners, we ſhall ſee that they are all framed upon this principle; wherefore it would be needleſs here to particulariſe them. If the wine is grown very ſour, the beſt way of correcting it, ſo as to preſerve the ſpirit and flavour, is, by adding a quantity of ſalt of tartar ſufficient to neutralize the acid, juſt before it is to be uſed. It then becomes a pleaſant wholeſome liquor: but if ſalt of tartar is mixed with any fermented liquor long before it is to be uſed, the effervеſcence which it raiſes will deprive the liquor of its ſpirit, and leave it quite vapid. Iſinglaſs is uſed only for clarifying the wine. Weak wines are improved by an addition of ſpirit, particularly before the fermentation is completed, for after this period it is apt to ſpoil the vinoſity. Poor wines are enriched by ſweets, and flavoured by various additions ſo as to emulate the more coſtly: thus elder-flowers give the flavour of Moſelle, and the flowers of the yellow clary will make almoſt any common white-wine reſemble new Heniſh. Even the moſt delicious wines have been immitated alſo without a drop of the juice of any grape; with ſolutions of ſugar, juice of currants, figs, and other fruits.

After the wine, and particularly that of countries where the ſun is not very powerful, has paſſed its fermentation in the vat, and is drawn off into caſks, it will require ſomething to feed upon. To this end, it will be right always to preſerve a few bunches of the beſt grapes, which may be hung up in a room till there be occaſion for them; when they ſhould be picked off the ſtalks, and two or three good handfuls of them ſhould be put into each caſk, according to its ſize.

The French recommend ſtrongly the two following methods; the one for giving additional ſtrength and colour to red wine, and the other for clarifying wines in general.

For the former, a ſound well-hooped caſk is ſet upright on one of its ends, the other end is taken out, and a layer of vine-cuttings is ſpread at the bottom of the caſk, to the depth of about three inches. Some of the fineſt and ripeſt black grapes are then choſen, and their berries are cut off from the ſtalks, as cloſe as poſſible to the fruit, which the utmoſt care is taken not to burſt or damage. The grapes thus ſelected are put gently upon the layer of vine-twigs, and the caſk is filled with them up to the beginning of the bung-hole. Another layer of vine-cuttings is placed gently upon theſe grapes, till it reaches the upper part of the bung-hole, and the caſk is then filled with grapes, culled as before, to within a foot of the top, where another layer of vine-cuttings is ſpread over them, and the head of the caſk is then replaced. The caſk thus prepared is filled with good coarſe red wine, to within three fingers breadth of the bung-hole, that the liquor may have room to ferment without much loſs, and in this ſtate it is carried gently to the place where it is to remain. Great care is taken to keep this veſſel conſtantly filled up with wine of the ſame ſort, both whilſt it ferments, and afterwards as it is uſed: for if the grapes in it were at any time to be left long without a ſufficient quantity of wine upon them, the whole would grow vapid and be ſpoiled. The principal uſe which the vintners make of this liquor, is to ſupply their cuſtomers conſtantly with wine of the ſame taſte and colour, by mixing it with what they ſell.

The other method, which is practiſed only when wine is to be fined very ſpeedily, conſiſts in this. A parcel of very thin chips, the longer the better, or of pretty thick ſhavings, of new but well dried beech, is ſteeped for two days in water, which is changed at leaſt twice a day, the better to take off the taſte of the wood. Theſe chips are then well drained; and after they have been thoroughly dried in the air, as many of them are put lightly into a caſk, of which the head has been taken out for this purpoſe, as will fill it to within about a finger's breadth of the top. The head is then properly replaced in the caſk, ſo as to fit it for holding liquor, and a pint of good brandy is poured in at the bung-hole, upon the chips. After this, the bung-hole is ſtopped cloſely with a bung, and the caſk is rolled about till the chips have imbibed all the brandy. The caſk is then carried to its allotted place, and immediately filled with ſome of the wine that is to be ſpeedily fined. The wine will ſoon be fit for drawing off; and when that is done, the caſks with the chips in it ſhould be filled up again directly, becauſe the chips, like the grapes and wine-cuttings beforementioned, will looſe all their virtue if they are left long without a ſufficiency of liquor upon them.

When the wine that is poured upon theſe chips begins to require a length of time in order to its becoming fine, it is a ſign that they are over-loaded with lees. The head of the caſk is then taken out anew, the chips are waſhed in water till they are cleared of the lees, they are then dried in the air as before, and after being again ſoaked with brandy, or waſhed in perfectly clear wine, they are replaced in their former caſk; after that this alſo has been well waſhed and cleaned, and they continue to anſwer the ſame purpoſe as at firſt.

All the abovementioned practices are innocent enough; but, as Dr. Neumann righly obſerves, ſome of the dealers in wines have had recourſe to ſuch dangerous artifices as have been pernicious to thouſands. They have ſweetened acid wines by litharge, or other preparations of lead; and impregnated ſweet ones with mercury-ſublimate and with arſenic. Lead is diſcovered in wines by adding a decoction of orpiment made in lime-water. If the wine is genuine, it does not ſenſibly change its colour on this addition, though on ſtanding, a yellowiſh white powder falls to the bottom: but if it has any ſaturnine impregnation, its colour becomes immediately darker, brown, reddiſh, or blackiſh. Arſenic may be detected by a ſolution of

of lead in aqua fortis; and mercury ſublimate, by volatile alkaline ſpirits, or by a ſolution of fixed alkaline ſalts.

As to the concentrating of wines by cold, commonly called condenſing or congealing of them, it ſeems to us ſo much a matter of mere curioſity, rather than of uſe, that, though Dr. Stahl has taken the pains to give a full and accurate account of the manner of performing this proceſs, by which the wine is not only freed from its ſuperfluous humidity, ſo as to be greatly diminiſhed in bulk, and of courſe rendered more convenient for tranſportation, but alſo, ſay the advocates for this practice, infinitely enriched and ennobled in its quality, and rendered ſo much more perfect and durable, as to be from thenceforth unalterable by any accident or changes of the weather for by this means, "the philoſophic ſpirit of the wine," (to uſe the language of the adepts) is obtained.

"When wines, ſays Dr. Neumann, are expoſed to the action of a freezing air, a part of their water congeals, and the unfrozen part proves proportionably ſtronger and more ſpirituous. By repetitions of this proceſs, firſt pointed out by Paracelſus, and ſince carried to a greater length by Stahl, the beſt wines are reduced to about one ſixth of their orignal volume. Wines thus concentrated or freed from their redundant phlegm, are no longer the delicate liquors they were before. They are too unpleaſant as well as too ſtrong, to be drank by themſelves; and when mixed with other wines, they communicate to them alſo a diſagreeable taint. The phlegm which congeals retains a part of the truly vinous matter, as appears from its being convertible into vinegar; but this phlegm, mixed with the unfrozen wine, does not reſtore its priſtine qualities: both the phlegm by itſelf, and the mixture, ſoon corrupt. When once the principles of wine are ſeparated from one another, no art can reproduce wine by joining them together again. When barely the inflammable ſpirit has been diſtilled off, the addition of that ſpirit to the reſiduum does not reſtore its vinoſity. The reſiduum itſelf often ſuffers a new ſeparation upon this addition, its tartareous parts precipitating."

When the wine is of an age at which it uſually is bottled, care ſhould be taken to examine whether it be ſufficiently bright; becauſe a natural brightneſs is the moſt certain indication of the liquor's having undergone a due fermentation, and conſequently of its being rendered moſt wholeſome. If any ſmall degree of cloudineſs is obſerved in it, the whites of eggs will eaſily remove that imperfection; and if it inclines to tartneſs, the ſhells of the eggs ſhould be mixed with their whites: but if the degree of cloudineſs is thought to be greater than the whites of eggs will cure, recourſe is had to iſinglaſs, the quantity of which ſhould be proportioned to the quantity of the liquor, and to its degree of foulneſs; for wine that becomes bright of itſelf does not need any. The proper way of uſing the iſinglaſs, is to diſſolve it over the fire in ſo much water as will form it into a jelley; then to dilute it ſufficiently with ſome of the ſame wine as it is intended to clarify, afterwards to ſtrain it through a flannel bag, and finally to pour it into the caſk, and ſtir it well about with a whiſk that reaches only to about half way down the caſk. For wine that is very tart, the proper corrective is powdered marble, alabaſter, or un-burnt lime-ſtone, as before directed.

A quite faſhionable gentleman would hardly have vouchſafed, a few years ago, to taſte a glaſs of Champagne which did not ſparkle or froth ſtrongly: but that notion of its excellency is now pretty much laid aſide. Opinions have been ſo greatly divided in regard to the cauſe of this ſparkling, ſome aſcribing it wholly to the force of drugs uſed for that purpoſe by the dealers in this wine; others imputing it to the unripeneſs, or, as ſome call it, the tartneſs of the wine, becauſe, in fact, moſt of the wines that do ſparkle and froth are extremely tart; and others again attributing this effect to the influence of the moon, according to the times of bottling theſe wines, that we cannot do better than copy here the ſubſtance of what the authors of the Maiſon Ruſtique have ſaid on this ſubject.

"It is true that many dealers in wine, ſeeing how immoderately fond moſt people were of this ſparkling liquor, did often put into it alum, ſpirit of wine, pigeon's dung, and many other drugs, to make it froth exceedingly; but it is certain, from experience, that the bottling of it at any time between the vintage and the month of May, will alſo make it froth. Some pretend that it froths moſt when it has been bottled neareſt to the time of gathering the particular ſort of grapes of which it was made; but many deny this. There is no time of the year in which it froths more than at the end of the ſecond quarter of the moon in March; and that without any artifice at all. One may always be ſure that the Champagne wine which has been bottled between the tenth and the fourteenth days of the ſame moon will froth perfectly. This has been proved by ſuch reiterated experience, that it cannot be doubted. It is, however, proper to obſerve, that the wine does not froth immediately after its having been boiled. It muſt have been at leaſt ſix weeks, and often two months in bottles, before it will froth well. If it has been tranſported to any diſtance, it muſt be let reſt for a month in the vault, eſpecially in ſummer, to recover itſelf.

"But as the Champagne wines; and particularly thoſe of the mountain of Rheims, are not in general ſufficiently ripe for bottling at the above mentioned time, but ſtill retain too much tartneſs or hardneſs, if the ſeaſon has been cold and moiſt; or too much ſweetneſs, if it has been hot; the ſureſt and beſt way to have exquiſite wine which ſhall froth perfectly, is not to bottle it till the riſe of the ſap in Auguſt. Experience has certified that it froths exceſſively when bottled between the tenth and the fourteenth of the moon in Auguſt: and as it will by that time have loſt its too great tartneſs, or its over great ſweetneſs, one may be aſſured that the wine which is bottled then will be the ripeſt and moſt frothy.

"Another experiment has been tried, which is, not to bottle the Champagne mountain wine till the ſpring of the ſecond year, that is to ſay, eighteen months after it has been made; and it has been found to froth ſufficiently, though not above half ſo much as that which was bottled while the ſpring-ſap of the preceding year was riſing. It is not thought that the river wine, which has leſs body than that of the mountain, can froth ſo much in the ſecond year.

"They who would have Champagne wine that does not froth at all, muſt bottle it in October or November of the year after the vintage. If it be bottled in June or July, it ſtill will froth a little, though but very little.

"As theſe wines, eſpecially in their firſt year, work continually in the cellars and vaults, and ſtill more in bottles than in caſks, according to the different ſeaſons and the different impreſſions of the air, it is not ſurprizing that the ſame wine, particularly the new, ſhould ſometimes appear different to the taſte. A wine, for example, which is fit for drinking in January and February, ſhall ſeem hard in March and April; becauſe of the riſing of the ſap which then agites it: and this ſame wine after ſeeming to be

perfect

perfectly ripened in the next June and July, ſhall again have, in Auguſt and September following, a hardneſs which could not be perceived in either of the two preceding months; becauſe the riſing of the ſap in Auguſt will have increaſed the motion of its parts, or in other words, have ſet it on the fret. Thus the ſame Champagne wine of the firſt year, if it be of the river growth, and frequently that of two years old, if it be of the growth of the moutain will appear more or leſs ripe or mellow, more or leſs exquiſite, more or leſs forward, according to the different motions it receives from the different impreſſions of the air, which vary moſt ſenſibly in the different ſeaſons of the year."

What is here implied, though perhaps not quite clearly expreſſed, is, we apprehend, the true cauſe of the ſparkling or frothing of wine; namely, its not having been perfectly fermented, and conſequently not had a thorough aſſimilation of its conſtituent parts. The want of this certainly makes it fret in the bottle: and accordingly we ſee, that the better to ſecure its ſparkling, the people of Champagne bottle it in the very ſeaſon when it is moſt likely to be on the fret; viz. at the time of the weather's turning from cold to warm. Several other cauſe will likewiſe put wine on the fret, and among theſe a principal one is the want of cellars in which an equal temperature of the air is preſerved all the year round. This, and the imperfectneſs of the fermentation of the liquor, are undoubtedly the real cauſe of the ſparkling or frothing of wine.

As a general rule, if it be intended that the wine ſhould not froth, the beſt time for drawing it off, whether into bottles or into caſks, is when the weather is extremely fair and clear, the barometer high, and, of choice, during a notherly wind; becauſe the air is then cooleſt, and the wine leaſt apt to be on the fret. By inverting theſe rules, and drawing off the wine in warm damp weather, when the barometer is low, and the wind ſoutherly, what is bottled at this time will froth; for wine in the caſk is always cloudy then, and conſequently diſpoſed to fret.

It may not be uninſtructive, and certainly cannot be unentertaining to our readers, if we copy here Dr. Neumann's account of, and curſory remarks on, the principal wines that are drank in Europe. "1. The Madeira iſlands, and Palma, one of the Canaries, afford two kinds: the firſt called Madeira Sec; the latter, which is the richeſt and beſt of the two, Canary or Palm Sec. The name Sec (corruptly written Sack) ſignifies dry; theſe wines being made from half dried grapes. There is another ſort of Sec wine, inferior to both the foregoing, prepared about Xeres in Spain, and hence called, according to our orthography, Sherris, or Sherry. 2. The wines of Candia and Greece, particularly the latter, are of common uſe in Italy. Malmſey was formerly the produce of thoſe parts only, but is now brought chiefly from Spain: it is a ſweet wine, of a golden or browniſh-yellow colour: the Italians call it *Manna alla bocca e balſamo al cervello*, "Manna to the mouth and balſam to the brain." Zant and Cephalonia ſend alſo to Venice ſome good, and no ſmall quantity of indifferent wines: almoſt all the wines indeed made uſe of in the Venetian territories come from Greece and the Morea; of which there are ſome ſorts ſo bad, and ſo cheap, that large quantities are made into vinegar for the preparation of ceruſſe. 3 Italy, not Greece, produces the *vino Greco*: this is a gold coloured unctuous wine, of a pungent ſweetneſs, the growth of Mount Veſuvius, greatly ſophiſticated by the Neapolitans. In the neighbourhood of Veſuvius is made the Mangiaguerra wine, as alſo a thick blackiſh one called Verracia; and at the foot of the hill, the delicious *vino vergine*. The Italians apply this laſt name likewiſe to all the other wines made without preſſure. The kingdom of Naples affords the Campania or Pauſilippo and Muſcatel, the Surentine, Salernitan, and other excellent wines, as alſo the Chiarello, much drank at Rome. But the principal of all theſe wines is the red, fat, ſweet, and gratefully poignant one, called *Lachryma Chriſti*. The eccleſiaſtical ſtate produces the light, pleaſant Albano; and the ſweet Monteſiaſcone, a yellowiſh not very ſtrong wine, which comes the neareſt to good Florence, but does not keep well; together with ſeveral of leſs note, as the Nomentan, Monteran, Velitrin, Prænetic, il Romaneſco, d'Orvieto, &c. 5. In Tuſcany are the excellent white and red Florence; the celebrated, hot, ſtrong red wine of Monte Pulciano; the Montalneo, Porte Hercole, &c. But along the coaſt of the Adriatic, at Ancona, Rimini, Peſaro, and as far as Bologna, one meets with exceeding bad wines, chiefly of the boiled unfermented kind, heavy, diſagreeable, and unwholeſome. 6. In Lombardy alſo there is abundance of bad wines: the Modeneſe and Montferrat are tolerable; the Marcemino, produced about Vicenza and Padua, pretty good. The other wines moſt commonly drank in that province are the Breſcian, Veroneſe, Placentine, Lumelline, and Pucine; and in the Genoeſe, the Vino di monte vernaccia, vino amabile or vino di cinque terre, and Vino razzeſe. Between Nizza and Savona is produced an incomparable Muſcadine: near Aquileia is the Roſatz, and near Pavia the Vino Piccante. 7. Piémont, and part of Savoy, have excellent light wines. 8. The Sicilian, Sardinian and Corſican wines are alſo good: the firſt, as particularly the Catanian, Panormitan, Meſſinian, and Syracuſan, are accounted the beſt, and are chiefly bought up by the knights of Malta. 9. Moſt of the Spaniſh wines are compoſed of fermented or half fermented wine, mixed with inſpiſſated muſt and variouſly manufactured, or of an infuſion of dry grapes in weak muſt. No wines freeze more difficultly than the Spaniſh; theſe abounding both with unctuous matter and with inflammable ſpirit. The principal of them are, the Alicant, which is a thick, ſtrong, very ſweet, and almoſt black as well as nauſeous wine; Sherry, Spaniſh Malmſey, Malaga, commonly called mountain, and what is ſimply termed Spaniſh wine. Theſe, at leaſt, are the ſorts moſt generally imported here: but in Spain itſelf there are many more, ſuch as, the Tarragon, Salamanca, Cordova, Galicia, Andaluſia, ſundry baſtards, vino de toro, &c. 10. In Portugal there is plenty of red Port, a cheap but not a very excellent wine, drank in large quantities in England, and often dreadfully ſophiſticated. The beſt vino tinto, a blackiſh red wine uſed by the coopers for colouring other wines, is ſaid by ſome to be the produce of Portugal. So largely do the Portugueze deal alſo in Madeira, that their king receives yearly twelve thouſand pipes of this wine by way of tythes. 11. In France, there is a great variety of wines; of which the ſtrong, ſweet, full-bodied, ſpirituous ones are called *Vins de liqueur*. There is ſcarcely a province in France that does not produce wine: Languedoc and Provence afford the ſweeteſt: and the ſame provinces, with Champagne and Burgundy the ſtrongeſt. The wines of the northern parts of that kingdom, as Picardy and Bourdeaux, are the worſt; and thoſe about its middle, as Paris and Orleans, of a middling kind. The moſt celebrated of the French wines are thoſe of Champagne and Burgundy, the Coterotie, St. Lawrence, Frontignac, Muſcat de

de Lion, Cahors, Hermitage, Grave, &c. 12. In Switzerland, the beſt are the Neufchatel, Velteline, La cote, and Reiff wines. The Velteline ſtraw-wine, ſo called from the grapes being laid for ſome time upon ſtraw before they are preſſed, is particularly celebrated. 13. The dry-grape wines of the Upper Hungary are in general excellent, and greatly ſuperior to thoſe of the Lower. They have a delicious aromatic ſmell and taſte, a notable diaphoretic, and corroborating virtue, and when drank freely occaſion no head-ach, heavineſs of the limbs, or other inconveniencies. They do not eaſily become vinewed even in open veſſels; and retain their ſweetneſs and agreeableneſs for a length of time, though they looſe a little of it from year to year. 14. Among the German wines, the Tyrol are very delicate, particularly thoſe of Tramin and Etſch; but they do not keep. 15. Good Auſtrian wine is not to be rejected. Thoſe of Kloſter-Neuberg and Broſenburg are counted the beſt, and, in the opinion of ſome, excel in taſte that of Edenburg in Lower-Hungary. There are alſo good wines in ſeveral other parts of the imperial dominions. 16. In the Palatinate, the beſt wine is that of Worms, eſpecially the ſort called woman's milk; and next to this, thoſe of Edinghoff and Ambach. 17. Among the more eſteemed German wines are to be reckoned alſo Rheniſh, Mayne, Moſelle, Neckar, and Elſaſs. A certain writer calls the Rheniſh made in Hockheim (hock) the prince of the wines of Germany. 18. The Bohemian, Sileſian, Thuringian, Miſnian, Naumburg, Brandenburg, and other German wines, are generally inferior to the foregoing. Some however, of thoſe of Miſnia and the Marche, made from ripe picked grapes, have this advantage, that they are greatly meliorated by age, ſo as to be preferred by many to the Rheniſh, Neckar and Franconia wines, and frequently mixed with other of greater note. The tartiſh German wines keep the longeſt of any: ſome of them have been kept two or three hundred years; and in Straſburg there is a caſk of it fourteen hundred years old, and many above ſeventy; the wine being occaſionally racked off into ſmaller and ſmaller caſks, that the veſſel may be conſtantly full. Theſe very old wines are preſerved rather for curioſity than uſe, as they not only grow too ſtrong for drinking, but at laſt quite diſagreeable. The beſt are thoſe of a middle age, from twenty to about fifty years."

We cannot cloſe more properly, than with the above quoted excellent chymiſt's definition of the caracters of good wine.

"The goodneſs and wholeſomeneſs of wines are judged of, from their being bright, clear, and ſparkling in the glaſs; of an agreeable reviving ſmell and taſte; leaving, when held in the mouth for ſome time, a ſlight ſenſe of aſtringency; being moderately ſtrong and ſpirituous; paſſing freely by urine; exciting appetite; producing a gentle ſweat in the night; keeping the belly open the next day; without being followed by any head-ach, heavineſs of the limbs, or other uneaſineſs. Such a wine, moderately uſed, is a very valuable cordial. The ſweet rich wines are either new, or very ſtrong and fiery: they heat the body much more, and, if drank to any degree of exceſs, their effects continue much longer than thoſe of the thinner wines, which contain an equal quantity of ſpirit. The red wines, in general, have the greateſt aſtringency."

The following directions for making domeſtic wines, taken from the Muſeum Ruſticum, will, we are perſuaded, be agreeable to our readers.

"As to the art of making wine, I think the rendering it more generally known, and practiſed here, may not only afford a convenience with regard to expence, and a ſecurity with regard to health, to private perſons; but an advantage to the public, in the balance of trade, a principle, at preſent, overlooked: though, in a ſhort time, it will probably be ſeen in a more intereſting light.

"Among the various articles of foreign luxury, wine certainly makes one of the moſt capital; and yet, what with the taking ſuch extreme great quantities, as oblige us to receive, as well the product of inferior, as good vintages; and what with adulteration, as well practiſed before the wine is imported hither, as after, we in general drink very indifferent natural wines, or very exceptionable artificial mixtures of liquors, called ſo. Though for theſe we either pay great annual ſums to foreign countries, or to thoſe who make it their buſineſs to impoſe upon us at home.

"This is the more to be regretted, becauſe we have it in our power wholly to avoid it; and, by a little attention and trouble to provide ourſelves with wine that is ſuperior in flavour, cordial effect, wholeſomeneſs, and every other quality, with a ſaving of at leaſt fifty or ſixty *per cent.* of the expence. The means by which I ſuggeſt it to be in our power to do this, is by the domeſtic production of wine in our own families: which, were the art well known, and the advantages, as I have here enumerated them, well underſtood, could not ſurely fail to be a much more general practiſe than it is at preſent.

"It may be ſaid to appear from experience, that wine thus made here, is not ſo good as the foreign: and that we find, in the inſtances of thoſe, who have tried to introduce it, the ſucceſs is not equal to my repreſentation. To this I anſwer, that experience has verified what I advance, in the few inſtances of thoſe who have made domeſtic wine with ſkill, and kept it to be of a due age; without which, even foreign wine would not be good. But the reaſons, why greater numbers do not ſucceed, is the want of knowledge; a ſordidneſs with reſpect to expence; or the drinking the wine before it be fit; which is almoſt univerſally the caſe. For, where this art has been practiſed without any of theſe diſadvantages, ſuch wine has been produced, as not only has equalled the foreign, in all general good qualities, but has even been miſtaken for ſeveral of the moſt valuable kinds, even by the moſt ſkilful judges.

"The want of knowledge in the art of making domeſtic wine, being, therefore, one principal cauſe of the neglect of doing it more frequently, I ſhall here endeavour to remove it, by furniſhing ſuch inſtructions, as can ſcarcely fail to enable any attentive perſon to practiſe it, with eaſe and certainty. And, I am perſuaded, that, to middling people, eſpecially thoſe living in villages and places remote from ſea-ports, where it is difficult to procure even indifferent wine in ſmall quantities, I ſhall do a material kindneſs: though the advantage of making domeſtic wines is, by no means, confined to ſuch perſons, or ſituations; but even all others might find their account in it, both with reſpect to expence and health.

"I will, therefore, firſt give a recipe for making the moſt perfect wine, that can be produced, by compoſition, in this country. By compoſition, I mean, ſuch as is not made of the ſimple native juice of any one kind of fruit. But this kind is, indeed, in great degree native, as the water added to the dry fruit is only, in fact, the reſtoration of what evaporated in the drying and ripening the fruit: and the produce of this proceſs is, therefore, in

reality, a natural wine, and ſuperior to any that can be made of the native juices of the fruits of our country; or perhaps equal to the beſt of thoſe of any other. This recipe will ſerve, alſo, as a baſis for the ſhowing afterwards how other, and cheaper kinds, may be made.

"Take thirty gallons of ſoft water, either rain, or river water. It ſhould be obtained in as clear a ſtate as poſſible, but boiling is needleſs. Put this water into a veſſel, at leaſt one third bigger than will contain that quantity: and then add to it one hundred weight of Malaga raiſins, groſsly picked from ther ſtalks. Mix the whole well together, that the raiſins may not remain clotted in lumps: and then cover it partly, but not intirely, with a linen cloth; and let it ſtand in a warm place, if the ſeaſon be not hot. It will ſoon begin to ferment, and muſt be well ſtirred about, twice in twenty-four hours, for twelve or fourteen days. It muſt be then examined, by the taſte, to try if the ſweetneſs be nearly gone off: and if that be found ſo, and the fermentation be greatly abated, which will be perceived by the raiſins beginning to lie quietly at the bottom, the fluid muſt be ſtrained off; and preſſed out of the raiſins, firſt by the hand, and afterwards by a preſs, if ſuch be eaſily procured. But, if there be no preſs, two boards may be uſed, with the aſſiſtance of a large weight, or other ſtrong compreſſive force, which muſt be continued as long as any fluid can be made to drop from the maſs. The fluid, thus ſeparated from the ſkins, or marc of the raiſins, muſt be then put into a good ſound wine caſk, well dried and warmed, together with eight pounds of Liſbon ſugar, and a little yeaſt: but ſome part of the liquor muſt be kept out, to be added, from time to time, as the abatement of the fermentation, that will come on again, may admit, without the wine riſing out of the caſk. In this ſtate it muſt continue for a month, with the bung-hole open: and then the whole of the liquor kept out, having been now put in the veſſel, muſt be cloſely ſtopped up, ſo that no air may enter: and in this ſtate it muſt be kept for a year, or longer. At which time, it may be bottled off.

"This wine may be drunk, and will be very good at the end of a year and a half: but it will be much better, if kept longer: and will improve for four or five years. When it has a proper age, it will equal any of the ſtrong cordial foreign wines: and may, by the addition of proper ſubſtances to flavour and colour it, be made to reſemble them.

"This is the moſt perfect kind of what may be called artificial wine; but others may be made cheaper. There are two methods of making a ſaving in the expence. The one is, to ſubſtitute, inſtead of the whole quantity of raiſins here directed, a greater proportion of ſugar, leaving out four pounds of raiſins for one of ſugar added: or the quantity of both ſugar, and raiſins, may be diminiſhed, and a proportion of clean malt-ſpirits added, when the bung of the caſk is cloſed up. The uſe of diſtilled ſpirits, in this manner, is not ſo objectionable, as it may at firſt appear to perſons who are not unacquanted with theſe matters. For ſuch ſpirits will loſe their fiery quality, and be rendered ſoft and mellow, by their incorporation with the oily part of the wine. And there is nothing more certain, than that the practice of uſing them is general in the preparation of all the foreign wines, for our market; and moſt particularly thoſe ſtronger kinds, which are moſt eſteemed by us.

"Any other kind of large raiſins, which are cheap, may be uſed, as well as the Malaga: and the thinner the ſkins, and the ſweeter the pulp, the ſtronger will be the wine.

"It has been practiſed formerly to bruiſe the raiſins; but it is unneceſſary with reſpect to the common ſorts, as they will ſoon burſt with the fermentation, and freely give out their contents. But there are ſome ſmall kinds with tough ſkins, which, if employed for this purpoſe, ſhould be bruiſed, or they will reſiſt the penetration of the water. Theſe kinds are not, however, ſo good for the purpoſe of making wine as the larger; or, at leaſt, if they be choſen for any particular flavour they may give the wine, there ſhould be only a certain proportion mixed, added to ſome of the other kinds: and, in this caſe, they ſhould be firſt bruiſed.

"The practice of a double fermentation, as here directed, firſt of the raiſins themſelves, and afterwards of the ſugar, is not the common method: and very good wine may be made, by fermenting both at the ſame time. But this method is, nevertheleſs, preferable; for it ſometimes happens, from ſome unknown circumſtances in the fermentation, when ſuch method is not practiſed, that the wine will turn out cloudy, and not admit of being fined, by any means at preſent underſtood: which accident is prevented by this double fermentation remaining, as the ſecond perfectly works all the remaining half fermented part of the pulp. Moreover, in conſequence of this more perfect fermentation, the wine is lighter, and becomes wholeſome and perfect with leſs age, the glutinous matter of the raiſins being intirely reſolved.

"Of this wine, by adding the proper flavour, may be formed, imitations of all the natural wines, of a very ſtrong body: and, by abating the proportion of raiſins, ſugar, or both, other ſmaller kinds may, by the ſame means, be produced.

"If this wine be perfectly fermented, and kept a long time, ſo that no ſweetneſs remain, it will reſemble Madeira; and has very frequently paſſed for it.

"An imitation of Frontiniac may be made by this wine, in which the proportion of ſugar, or of malt ſpirits, to the raiſins, is large, and the whole body weaker. The muſcadel flavour of Frontiniac, being exactly to be imitated, by an infuſion of the flowers of meadow-ſweet, in ſome of the wine; and added in that proportion, which may be found ſufficient to raiſe the due degree of the flavour. In the making this artificial Frontiniac, the fermentation ſhould be ſtopt, by cloſing the caſk, and adding the ſpirit, while a conſiderable ſweetneſs yet remains: and the wine may be drunk after it has been a ſhort time in bottles.

"Cyprus wine may be immitated, alſo, by the ſame means: the infuſion of the meadow-ſweet being added to the wine prepared in the beſt manner above directed. But, in this caſe, three or four pounds more of ſugar, than the quantity given in the recipe, ſhould be uſed; and the fermentation ſtopt, while a conſiderable degree of ſweetneſs remains. This kind will be the better for age: and, if properly managed, can never be diſtinguiſhed, even by actual compariſon, from the true Cypruſs: as I can aſſert from the fact itſelf.

"The imitation of mountain is to be made, by preſerving a ſmall degree of ſweetneſs, giving the nut-like flavour, and keeping the beſt kind of the above wine to a due age. This nut-like flavour may be obtained, by the infuſion of the Florentine orris root, powdered, with a very ſmall proportion of orange and lemon-peel: and the wine may be rendered more dry or ſweet, by continuing the fermentation

tion a greater or leſs time; and adding a correſpondent proportion of clean malt-ſpirits, when the fermentation is ſtoopt ſooner. The adding ſome of the ſtoney ſeeds of the raiſins well bruiſed, alſo, gives the nut-like flavour: and the putting in a part of the ſtalks of the raiſins, gives a ſharpneſs, found in general in this kind of wine.

"The racy taſte of Canary, now commonly called ſack, may be counterfeited by the addition of a proper quantity of the juice of white currant-berries to the wine, made with a large proportion of ſugar to the raiſins, and left very ſweet in the fermentation. But it is ſaid, that a ſpirit, diſtilled from the leaves of clary and clean malt-ſpirits, and put to the wine, will give to it ſuch a ſtrong reſemblance of ſack, as renders it abſolutely undiſtinguiſhable from that wine.

"It is ſaid, alſo, that the juice of the bramble-berries, added to the mixture of the wine, before the fermentation, gives both the exact colour, and flavour of claret. But, in this caſe, the quantity of raiſins ſhould be conſiderably diminiſhed, and that of the ſugar increaſed, though not to the full proportion: as the fermentation muſt be continued till all ſweetneſs be deſtroyed; and this wine is not intended to have ſo great a body as the others.

It is better, therefore, for this imitation of claret, to work it only of moderate ſtrength, and to add ſome proportion of diſtilled ſpirit: it will be perfect at the end of two years. This, and the imitation of ſack by the ſpirit of clary, I have never ſeen tried; but have them on very good authority. I ſhould be apt to belive, a ſmall proportion of red-argol, or tartar, diſſolved in ſome of the wine, and added together with the ſpirit, when the bung is cloſed up, would aſſiſt the imitation very materially.

"Any intelligent perſon may eaſily collect, from theſe inſtructions, ſufficient lights to qualify them to make better or cheaper kinds of wine, according to their inclinaton. But whatever kind is made, at leaſt a year ſhould be given to it: and, in moſt caſes, a longer time. For nothing has ſo much contributed to the diſcrediting, and excluding the uſe of domeſtic wines, as the drinking them too new: eſpecially after an injudicious, and undue management of the fermentation; by which means they have been made to appear flatulent, aceſcent, and foul. But the very oppoſite of theſe qualities will be found in them, when properley treated and kept."

To WINNOW, to clear corn from the chaff, &c. *See the article* THRASHING.

WITHERS, the part of a horſe where the ſhoulder bones join at the bottom of the neck and mane.

All pinches of the ſaddle on the withers, ſhould be treated with repellers; for this purpoſe bathe the tumour well with hot vinegar three or four times a day: if that does not ſucceed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol diſſolved in a little water, and added to the ſame quantity. Theſe are generally very effectual repellers for this purpoſe in horſes, and will frequently prevent impoſthumation: when the ſwelling is attended with heat, ſmarting, and little hot watry pimples, the following mixture will then be more proper to bathe with.

Take two ounces of crude ſal ammoniac, boiled in a quart of lime water; where that cannot be had, a handful of pearl or wood-aſhes may be boiled in common water; pour off the decoction when ſettled, and mix with it half a pint of ſpirit of wine: anoint the part afterwards with linſeed oil, or elder ointment, to ſoften and ſmooth the ſkin.

But when theſe ſwellings are critical, the conſequence of a fever ſettled on this part, you muſt avoid the repelling method, and aſſiſt in bringing the ſwelling to matter, by means of ſuppurating poultices: experienced farriers adviſe never to open theſe tumours till they break of themſelves; for if they are opened before they are ripe, the whole ſore will be ſpongy, and diſcharge a bloody ichor, which ſoon degenerates into a ſordid ulcer. But take care to inlarge the openings and pare away the lips, that your dreſſings may be applied eaſily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the oppoſite ſide, open it in the ſame manner, but take care they incline downwards, for the ſake off depending orifices, and letting the matter flow off eaſily, and if the bones ſhould be found foul they muſt be dreſſed with tincture of myrrh till they ſcale off: if the fungus is very troubleſome, and the diſcharge oily, yellow, and viſcid, pledgits ſoaked in the following, made hot, have been found very effectual, bathing the ſwelling round with ſpirit of wine and vinegar.

Take half an ounce of blue vitriol, diſſolved in a pint of water; oil of turpentine, and rectified ſpirit of wine, of each four ounces; white wine vinegar, ſix ounces; oil of vitriol and Ægyptiacum, of each two ounces.

Theſe ſharp liquid applications are often found more efficacious dreſſings than ointments with precipitate, or verdigreaſe, or indeed any other digeſtives; as they inſinuate themſelves more readily into the interſtices of the fungè, or little quag-holes, ſo commonly obſerved in theſe kinds of ulcers; and at the ſame time, level and deſtroy the riſing and exuberant papillæ; whereby the ulcer grows more ſmooth and dry, ſoon heals up, and cicatriſes.

When the cavities are truly fiſtulous, the calloſities muſt be cut out, where it can be done with a knife; and the remainder deſtroyed by corroſives; viz. precipitate, burnt allum, and white vitrial. *Bartlet's Farriery, p.* 273.

WITH-WINE, *See the article* BIND-WEED.

WOAD, the Engliſh name of a plant, called by botaniſts *Iſatis ſativa, vel latifolia.*

This plant puts forth ſtems about three feet high, and of the thickneſs of a man's finger: theſe divide at their top into ſeveral branches loaded with many leaves irregularly placed; and theſe leaves, which reſemble pretty much thoſe of dog's-tongue, are ſleek, and of a bluiſh green colour. The branches bear alſo great numbers of flowers compoſed of four yellow petals diſpoſed croſs-wiſe: the pointal becomes a capſule flattened on the edge, and each capſule contains two oblong ſeeds; the root is large, woody, and penetrates deep into the ground. This plant delights in a warm climate, ſuch as Italy and the ſouthern parts of France: though it has likewiſe been cultivated in Normandy, and is ſaid to ſucceed in Germany; as experience has ſhewn that it does alſo in this country.

A light, black, kindly, and rich ſoil, or a meadow newly broken up, is choſen for the cultivation of woad; but it muſt not by any means be ſown on ſtoney or ſhallow land. It thrives well in plains, but ſtill better on the ſouth ſide of a hill: the eſſential point is, that the ſoil be good, and that it have the above-mentioned qualities

Though the land which is intended for woad be never ſo good, it muſt be dunged a year before it is ſown with this plant, and be made firſt to bear a crop of wheat, or of

onions, &c. After theſe are taken off, three deep ſtirrings ſhould be given with the plough, or, which is much better, with the ſpade: the firſt ſtirring ſhould be in November, and the other two in February, March, or April. If the land which is intended for woad lies flat, and has not ſlope enough to carry off the wet, channels muſt be cut of a greater or leſs ſize, according as the ground is more or leſs diſpoſed to retain the water.

In warm climates, woad is ſown ſo early as the beginning of April, unleſs the weather chances then to be too cold, in which caſe this ſowing is deferred till the beginning of May: but for countries like ours, where the ſpring is attended with froſts, particularly in the night, Mr. Miller is certainly right in adviſing to lay the land up in narrow high ridges juſt before winter, that the froſt may mellow it; to croſs plough it in the ſpring, laying it again in narrow ridges, and between this time and the enſuing month of June to harrow it well twice, at different intervals, in order to root up whatever weeds may have appeared: then, in June, to give the ground a third ploughing as deep as the plough will go, making the furrows narrow; after this, to harrow it again when any new weeds are come up; and finally, towards the end of July, or the beginning of Auguſt, to plow it for the laſt time, laying it as ſmooth as poſſible. A good harrowing after this will fit it completely to receive the ſeeds, which, if rain fall ſoon after their being ſown, or if they are ſteeped in water during the night before the ſowing, as Mr. Miller adviſes, will appear in a fortnight, if the ſeaſon be favourable. They ſhould be but lightly covered, and ſhould be ſowed ſo thin as that the plants may ſtand ſix inches aſunder. Some ſtrew pigeon's dung on the land juſt after having ſown it with woad, and the plants become much the finer for this manure.

It is a common cuſtom to ſow woad in broad caſt: but all plants which require being hoed ſhould certainly be ſowed in rows, becauſe this method greatly leſſens the labour and time of hoeing; and beſides, it is much eaſier, in this caſe, to give each plant its due diſtance.

When the woad is grown large enough to be diſtinguiſhed, it ſhould be carefully cleared of all weeds, for theſe would hurt it greatly; and at the ſame time the plants ſhould be thinned wherever they ſtand too cloſe: without this precaution, the woad would produce but very few leaves, and would remain extremely ſtinted in its growth.

The intervals between the plants ſhould be ſtirred whenever the ſeaſon requires it; and in the doing of this, by which the weeds thereby rooted out will ſoon be deſtroyed in dry weather, care ſhould be taken to lay a little earth up around the ſtems of the woad. M. Du Hamel, whoſe account we have here reſumed, ſays he has been aſſured, that, in countries where there is a conveniency of water, the woad-grounds are flooded; but to reap any benefit from this practice, the water ſhould be in ſufficient plenty for the huſbandman to be able to repeat the flooding frequently; for otherwiſe the heat of the ſun, after having exhaled the water too ſoon, would harden the ſurface of the earth, and thereby greatly injure the plants.

Woad generally affords two crops in the ſame year, and ſometimes when the ſeaſon has been favourable, it has yielded even four. The two firſt are the beſt, and theſe are commonly mixed together in the manufacturing of this plant: but the after crops are always kept ſeparate; for if theſe are mixed with the other, the whole will be ſpoiled. The two firſt crops will ſell for from twenty five to thirty pounds a ton; but the latter will not bring more than ſeven or eight pounds, and ſometimes not ſo much. An acre of land well huſbanded will produce a ton of woad, and in good ſeaſons near a ton and a half. The firſt crop is gathered towards the end of Auguſt, and the laſt at the end of October, or in the beginning of November: but this laſt crop muſt be got in before the firſt froſts comes on; for the leaves that might be gathered afterwards would not be worth any thing. When the plant is ripe, which is known by its firſt leaves beginning to dry, all the leaves are cut off by a man who graſps the plants by handfulls, and they are then laid in a heap to wither. Whilſt they are in this ſituation, they muſt be ſheltered from the ſun and rain, and they muſt be frequently turned, in order that they may heat equally: they are then carried to a mill ſomewhat like that which is uſed for preſſing the oil out of linſeed, and are there ground till they are reduced into a paſte, which is afterwards formed into cakes of about a pound weight, and theſe are laid to dry in a covered place, where neither the ſun nor rain can come to them. This paſte is dried thus for about a fortnight, that is to ſay, till it has acquired conſiſtence enough to be formed into ſmall roundiſh lumps, by means of little wooden moulds into which it is put for that purpoſe. As faſt as theſe lumps are taken out of the moulds, they are laid upon wicker hurdles looſely woven, ſo as not to touch one another, and in ſuch manner that the air may come at every part of them, as is practiſed in the drying of ſtarch. Theſe lumps become very hard, and in this condition it is that they are ſold. When they are to be uſed, they muſt be ſteeped a long while in water before they can be broken.

The woad thus prepared yields an excellent blue dye, very laſting, and with which all the degrees of this colour may be made. It is not long ſince this plant was preferred to indigo: afterwards, through a kind of toleration, the dyers were allowed to put a ſmall quantity of indigo into their vats of woad; but now that the making and manner of uſing indigo have been greatly improved, it is looked upon as a matter of indifference whether that or woad be uſed for dying blue.

At the laſt cutting of the woad, and with that cutting, the crown of the root is taken off; whereas only the leaves were gathered in the preceding cuttings. When it is intended to ſave the ſeed of woad, a ſmall portion of the plantation ſhould be allotted for this purpoſe at the laſt cutting, and then a part only of the leaves there ſhould be taken from the plants: but it is proper to retrench ſome of them, becauſe experience has ſhewn that the plants on which all their leaves are left run to ſeed too ſoon, and that their ſeeds have in this caſe often been diſtroyed by the cold of the enſuing ſpring. Thus woad, being a biennial plant, ſhould not be ſuffered to ſeed before the month of Auguſt in the ſecond year after it has been ſown; and therefore ſome of its leaves ſhould be cut off in October, to prevent its being too forward.

Beſides cold, weeds and drought, which are very pernicious to woad, locuſts will ſometimes devour a whole field of it in an evening. When theſe enemies are obſerved, all the leaves ſhould be immediately cut off, that the plants may put forth new ones.

The ſame field ſhould not be made to bear a ſecond crop of woad immediately after the firſt; for this plant is a great impoveriſher of the ground: but after it has been taken off, wheat may be ſown the firſt year, millet the ſecond, and in the third it may be laid down again to woad, if it has been well manured.

WOLVES TEETH, a name given to thoſe teeth, which grow in ſuch a manner, that their points prick, or wound either the tongue or gums, in eating. Old horſes are moſt liable to this infirmity, and whoſe upper overſhoot the under teeth in a great degree.

To remedy this evil, you may either chop off the ſuperfluous parts of the teeth with a chiſſel and mallet, or file them down, which is the better way, till you have ſufficiently waſted them.

WOOD, a large and thick plantation of trees.

The two moſt ſubſtantial timbers of this country are the oak and cheſnut; though the latter has been of late years almoſt entirely deſtroyed in England, ſo that there are ſcarce any remains of trees of ſize in the woods at preſent; but there can be no doubt of this tree having been one of the moſt common trees in this country, as may be proved by the old buildings in many parts of England, in which the greateſt part of the timber is cheſnut. Next to theſe, the elm is eſteemed as a profitable timber; but of theſe there are few cultivated in woods, eſpecially in the ſouth part of England, where they chiefly grow in hedge-rows, or plantations near houſes; but in the north-weſt part of England, there are numbers of very large trees of the witch-elm growing in parks, and ſome in woods, as if that tree was a native of this country, which has been much doubted; though as this tree propagates itſelf by ſeeds, it may be deemed an indigenous plant in England.

The beech is another tree common in the woods, eſpecially upon the chalky hills of Buckinghamſhire, Kent, Suſſex, and Hampſhire, where there are ſome very large woods entirely of this ſort; ſome of which have been of long ſtanding, as appears by the age of the trees; but whether this tree is a native of this country, has been a point often diſputed.

The aſh is a very profitable tree, and of quick growth; ſo that in leſs than an age, the trees will arrive to a large ſize from the ſeeds, therefore a perſon may hope to reap the profits of his labour, who ſows the ſeeds; but this is not a beautiful tree to ſtand near a habitation, being late in the ſpring in putting out its leaves, and the firſt that ſheds them in autumn; nor is it a friendly tree to whatever grows near it, the roots drawing away all the nouriſhment of the ground, whereby the trees or plants which grow near are deprived of it; ſo that where the aſh grows in hedge-rows, the hedges in a few years are entirely deſtroyed; and if they are in paſture-grounds, and the cows browze on them, the butter made with the milk will be bad; for which reaſon the aſh ſhould be ſown ſeparate in lands which are incloſed, where cattle are not permitted to come, and at a diſtance from the habitation.

Upon ſandy or rocky ſoils, the Scotch pine will thrive exceedingly, and turn to great advantage to the planter, provided the plants are planted young, and treated in a proper manner. There are alſo ſeveral aquatic trees, which are very profitable to thoſe who have low marſhy lands, where the harder kinds of timber will not thrive: theſe are the poplars of ſeveral ſorts, the willow, alder, &c.

Where there are young woods, great care muſt be taken of the fences; for if cattle ſhould get in among the trees, they will, in a ſhort time, do infinite damage to them, by browzing on their branches, or barking the trees; and during the firſt ten years of their growth, they ſhould be ſecured from hares and rabbits, otherwiſe, in ſevere froſt, when the ground is covered with ſnow, whereby they are deprived of other food, they will get into the woods, and eat off the bark from the young trees, and gnaw all the branches within their reach; ſo that in a few days, where there are plenty of theſe animals, there may be ſuch deſtruction made among the young trees, as cannot be retrieved, but by cutting them down to the ground, which will be a loſs of ſeveral years; therefore thoſe perſons who have the care of young woods ſhould be very diligent in froſty weather in looking over the trees and ſtopping holes in the fences to keep out all vermin.

Another care to be taken of young woods, is the thinning the trees from time to time, as they increaſe in their growth; but in doing of this, there muſt be great caution uſed, for it ſhould be gradually performed, ſo as not to open the trees too much, to let the cold air among them, which will greatly retard their growth; nor ſhould the trees be left ſo cloſe as to draw each other up like Maypoles, but rather obſerve a medium in this work, cutting down a few each year, according as there may be neceſſity for it, being careful not to permit thoſe to ſtand, which may ſpoil the growth of the neighbouring trees, always obſerving to leave thoſe trees which are the moſt promiſing.

The young trees in theſe woods ſhould not be lopped or pruned, for the more they are cut the leſs they will increaſe in bulk; every branch which is cut off will rob the tree of its nouriſhment, in proportion to the ſize of the branch; therefore the hatchet ſhould not be ſuffered to come into young woods, unleſs in the hands of ſkilful perſons.

Where perſons have more regard to the future welfare of the timber than their immediate profit, the underwood ſhould be grubbed up as the trees advance, that the roots may have the whole benefit of the ſoil, and their ſtems enjoy the free air, without which their ſtems are generally covered with moſs, and their growth greatly ſtinted; as may be obſerved in all ſuch woods where there is any quantity of underwood remaining, in which places it is rarely found that the trees do ever grow to a large ſize; therefore when large timber is deſired, the trees muſt have room to extend their roots and branches, without which it cannot be expected: but from a covetous temper, many people let their underwood remain as long as it will live; for as the timber increaſes, the underwood will be gradually decaying by the ſhade and drip of the large trees, ſo that by this method the timber ſuffers more in a few years than the value of the underwood; therefore by endeavouring to have both, neither of them can be ſo good as where they are ſeparately preſerved.

If perſons who have eſtates would be careful to nurſe up trees in their hedge rows, it would in time become a fortune to their ſucceſſors; as hereby the timber growing in the hedges may be worth more than the freehold of the eſtate, which has often been the caſe with eſtates from which their poſſeſſors have cut down timber for fortunes for their younger children; the frequency of this ſhould encourage perſons to be a little more attentive to the growth and preſervation of young woods, ſince the expence and trouble is not great, and the future profit very certain; beſides, the pleaſure of ſeeing trees of a man's own ſowing make yearly advances, muſt be very great to thoſe who have any reliſh for country amuſements.

There are ſeveral perſons who plant copſes for cutting every ten or twelve years, according to their growth. Theſe are uſually planted in autumn, either with ſtools or young plants, which are drawn out of the woods; the latter ſhould always be preferred to the former. Theſe copſes are commonly planted with ſeveral ſorts of trees, as oak, beech, cheſnut, aſh, birch, willows, &c. But the aſh

and cheſnut are the moſt profitable, where they grow kindly, becauſe the poles of aſh are very valuable: theſe alſo are good for hoops, ſo that there is no danger of having ſale for theſe cops woods when they are fit for cutting; but where the copſes are intended to remain, there ſhould be no ſtandard trees left for timber, becauſe as the heads of the trees ſpread, and overtop the underwood, it will cauſe that to decay, and where the ſtandards are left upon the ſtumps of the copſe wood they will never grow to a large ſize, nor will the timber be ſo valuable as that produced immediately from a young root; therefore whoever will make the experiment, will be convinced that it is more for the advantage of both to keep them in diſtinct woods.

But where perſons plant copſes upon land free from trees, it will be the better method to ſow the ſeeds, eſpecially if cheſnut, oak, or beech, are the trees intended; for although it is a prevailing opinion with the generality of perſons, that by planting they ſave time, yet I am ſure of the contrary; for if the ſeedling plants are kept clear from weeds, they will, in eight or ten years, out-grow thoſe which are planted; and theſe unremoved copſes will continue much longer in vigour than the other; ſo that for either timber or copſe wood, the beſt method is to prepare the ground well, and ſecure the fences and ſow the ſeeds, which is ſo far from loſing, that in twenty years it will be found to gain time, which is what every planter wiſhes to do.

The uſual time of felling timber is from November to February, at which time the ſap in the trees is hardened; for when the ſap is flowing in the trees, if they are cut down the worm will take the timber, and cauſe it to decay very ſoon; therefore if the durableneſs of the timber is conſidered, the trees ſhould always be cut in the winter months; but as the bark of the oak is ſo very valuable for tanning leather, there has been a law paſſed to oblige perſons to cut theſe trees during the ſpring-ſeaſon, when the bark will readily peel off, by which the timber is rendered unfit for building either ſhips or houſes, as it will be very ſubject to caſt, rift, or twine, and the worm will ſoon take it; therefore it will be more for the public benefit, if a law was enacted to oblige every perſon to ſtrip off the bark of ſuch trees, as are deſigned to be cut down in the ſpring when the bark will run, leaving the trees with their branches ſtanding till the following winter, which will be found to anſwer both purpoſes well. *Miller's Gard. Dict.*

WOOD-COCK *Soil*, ground whoſe ſoil under the turf is of the colour of a wood-cock, and is not good.

WOOD-LAND, ground covered with woods. It is alſo a term uſed by the farmers of many counties of England, for a ſort of ſoil, from its conſtant humidity and dark colour, reſembling the ſoil in woods, which, of whatever nature it originally is, will always be made to appear thus from the continual dropping of trees, and the want of a free air and ſun, together with the fall of leaves, deſtroyed and waſhed to pieces by the wet.

This ſoil in the open countries has a conſiderable quantity of clay in it, and holds the water a long time that once falls upon it: in wet weather it ſticks firmly to the ploughſhare; and, in dry, is very apt to crack. In uncultivated places it uſually produces ruſhes and ruſh graſs. A moiſt and dripping year is extremely detrimental to this ſort of land.

WOODY, abounding with wood.

WOOL, the covering of ſheep. Each fleece conſiſts of wool of ſeveral qualities and degrees of fineneſs, which the dealers therein take care to ſeparate.

The Engliſh and French uſually ſeparate each fleece into three principal ſorts, viz. 1. Mother-wool, which is that of the back and neck. 2. The wool of the tails and legs. 3. That of the breaſt and under the belly. The wool moſt eſteemed is the Engliſh, chiefly that about Leominſter, Coltſwold, and the Iſle of White; the Spaniſh, principally that about Vegovia; and the French, about Berry.

An account of three experiments made to diſcover whether wool, laid up in the fleece, alters in its weight.

It has been a matter of ſome doubt amongſt graſiers, farmers, and dealers in wool, whether or not wool, after it is ſhorn and laid up in the fleece, alters in its weight. The following experiments were made to decide this queſtion.

EXPERIMENT I.
This wool was ſhorn dry, and laid up in a two-pair of ſtairs room on a boarded floor.

	Weight lb.	oz.
1746, Aug. 10	76	6
Sept. 7	76	8
Oct. 14	77	11
Nov. 18	78	0
1747, Jan. 26	80	0
Feb. 20	80	4
Mar. 23	79	8
Apr. 18	77	13
June 24	76	8
July 28	76	8
Sept. 16	75	15
Nov. 2	78	1
Dec. 8	78	14
1748, Feb. 15	79	1

The weight was increaſed from Aug. 10, 1746, (when it was firſt laid up) to Feb. 20, 1747, in the proportion as 100 to 105.

EXPERIMENT II.
This wool was ſhorn dry and laid in a lower room, with a brick floor one foot above the floor.

	Weight lb.	oz.
1749, Oct. 15	100	4
Nov. 18	101	2
1747, Jan. 26	102	8
Feb. 20	102	11
Mar. 23	102	9

The weight increaſed from October 15, 1746, to Bebruary 20, 1747, as 100 to 102.$\frac{1}{2}$

N. B. It is ſomething difficult to account for this parcel of wool not encreaſing more in its weight, as it lay ſo near the ground floor; but very probably the air had been very damp and raw from the time it was ſhorn till the 15th of October, 1746, when it was firſt weighed, ſo that the wool had then very likely gained weight conſiderably.

EXPERIMENT III.
This wool was ſhorn dry, and laid up in a two-pair-of-ſtairs room with a boarded floor.

	Weight lb.	oz.
1756, Aug. 30	36	9
Nov. 19	37	2
Feb. 19	37	12
Mar. 24	37	6
April 1	37	4
Ditto 21	36	14
May 2	36	13
June 1	36	8$\frac{1}{2}$
Ditto 13	36	4
July 8	36	1$\frac{1}{2}$
Ditto 27	35	12
Sept. 30	36	4
1758, Jan. 25	37	11$\frac{1}{2}$

The weight of this wool encreaſed from the time it was laid up, Auguſt 30, 1756, to Feb. 19, 1757, as 100 to 103$\frac{1}{4}$.

Both

Both wool, and woollen rags, make an excellent manure.

WORMS are very prejudicial to corn fields, eating up the roots of the young corn, and deſtroying great quantities of the crop. Sea-ſalt is the beſt of all things for deſtroying them. Sea-water is proper to ſprinkle on the land, where it can be had; where the ſalt ſprings are, their water does; and where neither are at hand, a little common or bay-ſalt does as well. Soot will deſtroy them in ſome lands, but is not to be depended upon, for it does not always ſucceed. Some farmers ſtrew on their lands a mixture of chalk and lime; and others truſt wholly to their winter-fallowing to do it, if this is done in a wet ſeaſon, when they come up to the ſurface of the ground, and ſome nails with ſharp heads be driven into the bottom of the plough. If they are troubleſome in gardens, the refuſe brine of ſalted meat will ſerve the purpoſe, or ſome walnut leaves ſteeped in a ciſtern of water for a fortnight or three weeks, will give it ſuch a bitterneſs that it will be a certain poiſon to them. A decoction of wood-aſhes, ſprinkled on the ground, will anſwer the ſame purpoſe; and any particular plant may be ſecured both from worms and ſnails by ſtrewing a mixture of lime and aſhes about its roots. It is a general caution among the farmers to ſow their corn as ſhallow as they can, where the field is very ſubject to worms.

WORMS, a well known ſpecies of inſects, very troubleſome to horſes.

Authors have deſcribed three different ſorts of worms that affect horſes, viz. bots, which young horſes are often troubled with in the ſpring: the rotundi, or thoſe reſembling earth-worms; and the aſcarides, or thoſe about the ſize of the largeſt ſewing needle, with flat heads.

For the method of curing the bots, *ſee the article* BOTS.

As the ſource of worms in general proceeds from a vitiated appetite and a weak digeſtion, recourſe muſt firſt be had to mercurials, and afterwards to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and by deſtroying the ſuppoſed ova, prevent the regeneration of theſe animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conſerve of wormwood over night; and the next morning the above purge: theſe may be repeated in ſix or eight days. Or the following mercurial purge may be given, which will be leſs troubleſome, and no leſs efficacious.

Take crude quickſilver, two drams; Venice turpentine, half an ounce; rub the quickſilver till no gliſtening appears; then add an ounce of aloes, a dram of grated ginger, thirty drops of oil of ſavin, and a ſufficient quantity of ſyrup of buckthorn to make a ball.

One of theſe balls may be given every ſix days, with the uſual precautions in regard to mercurial phyſic; and theſe powders intermediately.

Take powdered tin and Æthiops mineral, of each half an ounce: give every night in a maſh, or his corn.

The various preparations of antimony and mercury muſt be given ſeveral weeks together, in order to get entire riddance of theſe vermin. The Æthiops mineral may be given to the quantity of half an ounce a day; the mercurius alkaliſatus to two drams a day, incorporated with a bit of cordial ball. The cinnabar powders, as directed in the farcy, are no leſs effectual: and when worms are bred from high feeding, or unwholſome food; rue, garlick, tanſy, ſavin, box, and many other ſimples, may be given ſucceſsfully; being for that purpoſe mixed with their food; as alſo, cut tobacco, from half an ounce to an ounce a day.

As the generation of worms perhaps principally proceeds from a weak ſtomach, and bad digeſtion, if the horſe be of a tender conſtitution, and a bad feeder, the following bitter drink ſhould be given to ſtrengthen his ſtomach, and mend his digeſtion, which will prevent the formation of theſe animals, interpoſing now and then a gentle ſtomach purge, prepared with an ounce and half of hiera picra made up into a ball, with ſyrup of buckthorn.

Take gentian root, zedoary and galangals of each two ounces; chamomile flowers, and tops of centaury, of each two handfuls; Jeſuits bark powdered, two ounces; filings of iron half a pound; juniper berries four ounces: infuſe in three gallons of ale for a week, ſhaking the veſſel now and then: and give a pint of this night and morning.

To anſwer this purpoſe alſo, an ounce of filings of ſteel finely powdered, has been ſucceſsfully given every day for a fortnight, or longer, in the horſe's corn. *Bartlet's Farriery, p.* 150.

WOUND, a hurt given by violence.

In all freſh wounds made by cutting inſtruments, there is nothing more required than bringing the lips of the wound into contact by ſuture or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and acroſs ſome of the large muſcles, the ſtitches are apt to burſt on the horſe's lying down and riſing up in the ſtall; in ſuch caſes the lips ſhould not be brought cloſe together; one ſtitch is ſufficient for a wound two inches long; but in large wounds may be at an inch or more diſtance; and if the wound is deep in the muſcles, care ſhould be taken to paſs the needles proportionably deep, otherwiſe the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the firſt ſtep ſhould be to ſecure it, by paſſing a crooked needle underneath, and tying it up with a waxed thread: if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding veſſel, dipped in a ſtrong ſolution of blue vitriol, ſtyptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, &c. and remember always to apply it cloſe to the mouth of the bleeding veſſels, and take care that it is kept there by proper compreſs and bandage, till an eſchar is formed; otherwiſe it will elude your expectations, and frequently alarm you with freſh bleedings.

I purpoſely avoid ſetting down any famous receipts for freſh wounds, whether ointments, or Fryar's balſams, being well aſſured, that in a healthy ſound conſtitution, nature furniſhes the beſt balſam, and performs herſelf the cure, which is ſo often attributed to the medicine; when it is otherwiſe, and the blood is deprived of its balſamic ſtate, as will appear from the aſpect of the wound, and its manner of healing, it muſt be rectified by proper in-

ternal

ternal medicines, before a good foundation for healing can be laid by any external applications whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledgit of tow ſpread with the wound ointment, and the wounded part kept as much as poſſible from motion.

Remember to dreſs all wounds of the joints, tendons, and membranous parts, with terebinthinate medicines: to which may be added honey and tincture of myrrh; and avoid all greaſy applications whatever; fomentations and poultices are alſo generally here of great uſe; the former thin and attenuate the impacted fluids, greatly promote a free perſpiration in the limb, and facilitate the unloading the ſurcharge on the veſſels, by quickening the motion of the fluids; while the latter, by relaxing the veſſels, abate their tenſion, and relieve the obſtruction, by promoting digeſtion.

Punctured wounds from thorns, or any other accidents, ſhould be treated in the ſame manner; applying the beer, or bread and milk poultice over the dreſſing, till ſome ſigns of digeſtion appear; and fomenting the part well every day. This method is alſo very ſucceſsfully uſed to thoſe ſwellings, which often ariſe on the neck from bleeding, the ſores being ſprinkled with precipitate, and burnt allum powdered, to fetch out the core, or fungus, which choaks up the orifice. The uſual method is to introduce a piece of vitriol, or ſublimate, which often brings on a plentiful diſcharge, fetches out the core, and makes a cure; but it is often with the loſs of the vein, and it ſometimes leaves a large ſwelling and impoſthumation.

In gun-ſhot wounds, when the ball has not penetrated too deep, it ſhould be extracted, if it can be fetched away without diſturbance, together with any extraneous bodies that might paſs in with it; the wound ſhould be dreſſed with the old digeſtive of Venice or common turpentine, divided with the yolks of eggs, to which may be added ſome honey and tincture of myrrh. The entrance of theſe wounds frequently requires to be enlarged, and a depending orifice ſhould always be procured if poſſible; and if the wound ſhould not digeſt kindly, apply the beer poultice, and foment with the diſcutient fomentation.

In ſcalds, or burns from gun-powder, or any other cauſe, when the ſkin remains entire, bathe the part well, and keep it ſoaked with rags dipped in ſpirit of wine camphorated: ſalt bound thick on the part has been found very effectual for this purpoſe: and indeed all ſaline and ſpirituous applications excel others, while the ſkin is yet unbroke; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſallad oil, and a plaiſter ſpread with bees-wax and oil; if the ſkin is ſo ſcorched, that ſloughs muſt be digeſted out, dreſs with the wound ointment and oil of turpentine, and finiſh the cure with any drying ointment. Should the horſe be feveriſh from the pain, bleed him, give cooling clyſters, and treat him as we have directed in ſimple fevers.

The fire ſuppoſed to be left in the part after injuries of this kind, is nothing more than the inflammation, which is the natural effect of ſuch cauſes; ſo that the whimſical notions and conceits concerning fire remaining in the burnt part, is extremely abſurd.

Wounds in the feet from nails, gravel, &c.

Accidents of this ſort are very common, and ſometimes for want of early care, prove of bad conſequence: for the parts being naturally tender, are very ſuſceptible of inflammation; and when matter is once formed, if a free diſcharge is not procured, the bone, which is ſpongy, ſoon becomes affected, and the whole foot is then in danger.

When any extraneous bodies, ſuch as nails, ſtubs, thorns, &c. have paſſed into the horſe's foot, you ſhould endeavour to get them out as ſoon as poſſible; and after waſhing the part with oil of turpentine, dreſs the hole with lint dipped in the ſame, melted down with a little tar; the foot may be ſtopped up with bran and hogs-lard heated together, or put into the turnip, or any ſoft poultice: this method is generally ſucceſsful, when the nail, &c. is entirely removed; but if any piece, or particle, ſhould remain behind, which may be ſuſpected by the degree of pain, and diſcharge of matter, after paring away the ſole as thin as poſſible, introduce a bit of ſponge tent, in order to enlarge the hole, that it may be drawn out by a ſmall pair of forceps, or brought away by digeſtion: if this method ſhould not ſucceed, but the lameneſs continues, with a diſcharge of a thin, bloody, or ſtinking matter, you muſt no longer delay opening the wound with a drawing knife to the bottom, and then dreſs as above directed, or with the turpentine digeſtive, divided with the yolk of an egg, and a little tincture of myrrh, afterwards with the precipitate medicine. *Bartlet's Farriery, p.* 246.

Y

YARD-LAND, a quantity of land, in ſome counties fifteen acres, in ſome twenty, and in others, twenty-four, thirty and thirty-four acres.

YELLOWS, a diſeaſe incident to horſes and other cattle, and more properly called the jaundice. *See the article* JAUNDICE.

"Having, ſays a correſpondent of the editors of the Muſeum Ruſticum, noted the frequent fatal effects of the diſeaſe in cattle, called the yellows, I ſome years ſince, reſolved to let no opportunity ſlip of being acquainted with this complaint, in order to aſſign its cauſe, inaſmuch as I apprehend it to be the forerunner of moſt chronical diſeaſes, to which great cattle are ſubject, as the murrain in the guts, ſcowering, aſthma, or wheezing, dropſy, and loſs of milk, &c.

"I have not hitherto been able to find any author who has treated of this complaint in a manner ſuitable to the conſequence thereof, ſo as to trace the ſymptoms in its ſeveral ſtages, in order to effect a cure; and, where this complaint has been quite neglected or ill cured, to point out the conſequence, by ſhewing how it may appear under the above-mentioned ſhapes, which, being miſtaken for originals when they are only conſequents, are rarely cured, through the firſt cauſe being unknown.

"This complaint, I apprehend, proceeds from a waſte of bile, that is, a preternatural running out of what is called gall; occaſioned by the rugæ, which are in the inner membrane of the neck of the bilious duct, becoming, by ſome accident, too weak to perform their office, ſo that the gall runs out of the bladder nearly as faſt as it runs in; by which means it forceth itſelf, or a conſiderable part at leaſt, into the porus bilarius, inſtead of being diſcharged by the ductus communis cholidochus into the inteſtines, and, by the means of the vena porta, mixes again with the blood, filling that with its ſharp pungent quality; which cauſeth that fluid to become of a fizy nature, and, conſequently, to move ſlowly in the channels through which it paſſes; whence ariſes that ſluggiſh diſpotion the beaſt in this complaint is ſubject to, and which is one of the firſt ſymptoms of the diſeaſe.

"And the liver, being deprived of the natural heat and weight thereof, is, together with the fizineſs of the blood, rendered incapable of performing its office, ſo that the ſupply of bile is not equal to the expence; nor is the blood purified from it as it ought, but paſſes on together till it fixes in ſome part, and there (if not timely prevented) forms a tumour very prejudicial to the beaſt.

"Theſe tumours I have ſeen appear externally in the glands behind the ears, of the ſhoulders, and of the flank, in the dewlap, round the corner of the hoofs, and in the udder, or milk-bag; internally, in the form of water, in the veins of fat between the muſcular parts of the body, in the kidney fat, and even between the coats of the guts.

"When theſe tumours, which appear externally, come to ſuppuration, the beaſt commonly recovers, though frequently it be a long time firſt.

"The ſeaſons of the year in which cattle are moſt ſubject to this complaint, are for about the five firſt weeks after they are put out to graſs in the ſpring, during which time the ſeaſon is apt to be very warm at days and cold at nights; the graſs being alſo tender, and abounding with moiſture: and in like manner in autumn; at which time the days are alſo warm and nights cold; and the graſs, on account of autumnal rains, tender as in the ſpring, and more ſo, if the preceding ſummer was tolerably dry.

"The cattle at theſe ſeaſons being faint and very ſubject to perſpire much, by which the pores are greatly opened in the day, and ſudden cold coming on at night haſtily contracts them; and before the warmth of the next day becomes ſufficient to ſet the parts thus contracted at liberty, the matter, which ſhould have been diſcharged by perſpiration, returns into the blood in order to paſs off by urine, by which means a much greater quantity of bile is ſecreted than otherways would; which paſſing into its receptacle, the gall-bladder, cauſes it to extend to a preternatural ſize; thereby extending the paſſage by its preſſure, till the rugæ are ſcarcely to be ſeen: whereby the reſiſtance made by them is not equal to the preſſure of the bile, which, conſequently, forces its way haſtily into the blood, in the manner before obſerved, inſtead of paſſing off as excrement by the guts.

"The early ſymptoms attending this diſeaſe, are, a ſhaking of the beaſt in a morning, and more particularly the hinder parts, as the loins, thighs, and legs; hollowneſs of the eyes, and the hair ſtaring; a dry noſe, and if the cold taken be great, hanging of the ears, the ſwelling of the dewlap, of the glands of the ears, the ſhoulders, or the flanks, and of one or more quarters of the udder, or milk-bag in cows; with a ſudden decreaſe of milk, what remains becoming, after a few days, more yellow than uſual, and will, if boiled, curdle: the fore teeth are generally looſe, as tho' they would drop out.

"If theſe ſymptoms, eſpecially the firſt, remain unobſerved, as is often the caſe in barren cattle, and ſuch as range at large, it frequently happens that the diſorder ſettles in ſome inward part; as on the pericardium, which cauſes wheezing, and the haſk, and uncommon poverty; when in the guts and meſentery, (or ſweet-bread) cauſes the laſk and ſcowering; and when in the vein of fat, between the muſcles, cauſes the dropſy and uncommon weakneſs.

"In this laſt complaint, on opening a beaſt, the milt or ſpleen was very ſmall and thin, not half ſo large as in a healthy ſtate, as was alſo the liver; but otherways ſound and perfect, the gall-bladder of an uncommon thickneſs, and its contents very little.

"In opening a beaſt which was waſted, and ſubject to wheezing and the haſk, the pericardium was become hard, and inclined to calloſity towards the part which joined the heart: the heart unuſually large, but ſound: the lights very ſound, but ſmall: the milt or ſpleen thin and withered: and the liver dryiſh, with a few ſmall hard knots therein: the gall-bladder near as the former.

"I have

" I have obſerved theſe knobs in others, and generally found the gall bladder, liver and ſpleen leſs or more affected; thoſe which had the laſk, and ſcowered, generally having their guts covered, the inſide with a large quantity of mucus reſembling frogs ſpawn: the fleſh of theſe is always of a yellow caſt.

" Having ſaid thus much of what I apprehend the cauſe, I will now preſcribe what I have very many times known uſed with good ſucceſs for a cure.

" Firſt, Suffer no blood to be taken away from the beaſt.

" Take a handful of rue tops, the like quantity of the greater celendine; ſhred them ſmall, and mix with them one ounce of turmerick root in powder (or inſtead thereof red ſanders); put theſe in three pints of ſtale old ale or beer, and cauſe it juſt to boil up; when it is cold enough, give it the beaſt warm: there is no occaſion to keep the beaſt in before or after, unleſs the inclemency of weather oblige.

" Two of theſe drinks, at forty-eight hours diſtance, will perfect a cure, if the diſeaſe be not of long-ſtanding.

" Should a ſcowering be come on, then, after the firſt drink, give the following on the intermediate days.

Take two pounds of oak-bark, boil it in one gallon of water till one fourth be conſumed; ſtrain it; in this water boil two pounds of rice till it be ſoft; mix with it half a pound of the burnt cruſt of bread, taken from the undeerſide of the loaf; and to all this put two quarts of milk; let it boil for twenty minutes; divide it in two parts, and give one to the beaſt at a time warm." *Muſeum Ruſticum, vol* II. *p.* 144.

YEOMAN, the firſt or higheſt degree of the plebeians of England. The yeomen are properly freeholders, and who cultivate their own lands.

YEW-TREE, the name of a well known tree, common on cold ſoils in many parts of England. The timber of the yew-tree is much eſteemed for various uſes.

Theſe trees may be eaſily propagated by ſowing their berries in autumn, as ſoon as they are ripe, upon a bed of freſh undunged ſoil, covering them over about half an inch thick with the ſame earth.

In the ſpring the bed muſt be carefully cleared from weeds, and if the ſeaſon prove dry, it will be proper to refreſh the bed with water now and then, which will promote the growth of the ſeeds; many of which will come up the ſame ſpring, but others will remain in the ground until autumn or ſpring following; but when the ſeeds are preſerved above ground till ſpring before they are ſown, the plants never come up till the year after, ſo that by ſowing the ſeeds as ſoon as they are ripe, there is often a whole year ſaved.

Theſe plants, when they come up, ſhould be conſtantly cleared from weeds, which, if permitted to grow amongſt them, would cauſe their bottoms to be naked, and frequently deſtroy the plants when they continue long undiſturbed.

In this bed the plants may remain two years; after which in autumn, there ſhould be a ſpot of freſh undunged ſoil prepared, into which they ſhould be removed in the beginning of October, planting them in beds about four or five feet wide, in rows about a foot aſunder, and ſix inches diſtance from each other in the rows, obſerving to lay a little mulch upon the ſurface of the ground about their roots, as alſo to water them in dry weather until they have taken root; after which they will require no farther care, but to keep them clear from weeds in ſummer, and to train them according to the purpoſe for which they are deſigned.

In theſe beds they may remain two or three years, according as they have grown, when they ſhould again be removed into a nurſery, placing them in rows at three feet diſtance, and the plants eighteen inches aſunder in the rows, obſerving to do it in autumn, as before directed, and continue to trim them in the ſummer, for what they are intended; after they have continued three or four years in this nurſery, they may be tranſplanted where they are to remain, always obſerving to remove them in autumn where the ground is very dry; but on cold moiſt land it is better in the ſpring.

Theſe trees are very ſlow in growing, but yet there are many very large trees upon ſome barren cold ſoils, in divers parts of England.

YOAK, *or* YOKE, a frame of wood, fitted over the necks of oxen, whereby they are coupled together, and harneſſed to the plough.

Horſes and oxen are the animals uſed for drawing ploughs. Sometimes the one, ſometimes the other, and ſometimes both together. It is impoſſible to determine which of theſe is the moſt proper. This depends upon the kind of food moſt eaſily obtained, the kinds of work required, and the expence of breeding, or purchaſing. If the real labour is to determine this, without any other conſideration, then oxen are to be preferred; becauſe as they ſtand to the draught, they will overcome a reſiſtance which horſes will yield to.

As it cannot be determined, what kind of cattle are moſt proper for the plough, ſo neither can it be determined, what number is neceſſary. This depends upon the ſtrength of the cattle, and the nature of the ſoil. The number varies according to the work in which the plough is to be employed, and often according to the cuſtom of the place, and fancy of the farmer.

The methods of yoking cattle in ploughs, vary almoſt as much as the number uſed. Some of them at firſt ſight are ſo aukward, that it is needleſs to conſider them. The only thing worthy of being enquired into, is, whether the cattle ſhould be yoked in pairs, or in a line before each other? We ſhall therefore conſider the advantages and diſadvantages attending each way, and compare them together.

The moſt common way of yoking cattle in ploughs is in pairs. There are ſome diſadvantages attending this way that are obvious. In ploughing the furrows betwixt ridges, the land-cattle go upon the ploughed land, and tread it down with their feet: this, eſpecially if the land is wet, hurts it very much.

There is another diſadvantage very obvious. Where there is but as much of the ridge unploughed as to allow the land-cattle to go upon it with difficulty, they are frequently either going into the oppoſite furrow, and thereby giving the plough too much land; or, which is worſe, they are juſtling the furrow-cattle upon the ploughed land.

To remove theſe inconveniencies that attend the ploughing with cattle yoked in pairs, ſome yoke them in a line before each other. It is obvious, that cattle yoked in this

this manner, going always in the furrow, neither tread upon the ploughed land, nor juſtle one onother. In theſe reſpects the yoking the cattle in a line before each other, ſeems to have the advantage.

It is to be obſerved, however, that this method is not quite free from inconveniencies. When examined it may perhaps be found attended with as great inconveniencies as the other.

When cattle are yoked in a line, they go all in the furrow. This makes it neceſſary to give the plough more land than ordinary, either by the ſoke or the muzzle; for if this be not done, the head and ſoke being in the ſame direction with the beam, and the cattle yoked to the middle of it, the plough will directly follow the cattle, without taking any thing off from the land. Now it is inconvenient to be obliged to give the plough land either by the ſoke or muzzle; for, when the ſoke is turned out of the plane of the beam, it makes the plough heavy to draw; and when the muzzle puts the draught too much to one ſide of the beam, it prevents the plough from going upright. The yoking the cattle in pairs is attended with none of theſe inconveniencies; for, in this caſe, the quantity of land, which the plough has naturally, when right made, is ſufficient to make it take off a proper furrow.

There is another inconviency that attends yoking cattle in a line, ariſing from the nature of the animals. Horſes and oxen, like men, love their eaſe, and are diſpoſed to throw the burden upon their fellows. This they have a better opportunity of doing when yoked in a line before each other, than when yoked in pairs. When yoked in a line, each pulls by the traces of the one behind him; and therefore, though it may be known when the foremoſt neglects his work, by the ſlackening of his traces, yet it cannot be known when any of the reſt neglect their work; for though one of them does this, yet by the pulling of the one before him his traces may be fully ſtretched. But this is eaſily diſcovered, when the cattle are yoked in pairs; for then every one of them has a ſeparate draught. The goadman, or driver, knows, by the poſition of the yokes or croſs-trees, whenever one of them does not draw equally with his fellow; and the ploughman perceives, by the going of the plough, whenever any of the two pairs does not draw equally with the other: for if the pair that goes foremoſt neglect their work, the plough is pulled out of the ground; and if the pair that go hindmoſt neglect their work, the plough is pulled in too deep. The reaſon is obvious; the plough is made to go at a proper depth, when the two forces by which different directions are given the plough, act at the ſame time. If one of them then ſhould ceaſe to act, the plough cannot go right. If the foremoſt pair ſhould ceaſe to draw, the plough having too little eard for the direction of the draught of the hindmoſt pair, will come out of the ground: and if the hindmoſt pair ceaſe to draw, the plough having too much eard for the direction of the draught of the foremoſt pair, will go in too deep. This does not hold in an ox-plough: for as the ſoam by which the foremoſt pair draw is fixed to the yoke of the hindmoſt pair, the whole force applied to the plough is in the ſame direction: and therefore, though any of the pairs ceaſe to draw, there is no alteration in the going of the plough.

There is yet another inconveniency that attends the common way of yoking cattle in a line before each other. When the fore cattle are all yoked to the traces of the hindmoſt, it is obvious, that as the beam, to which the draught is fixed, is much lower than his ſhoulders, by which the reſt pull, ſuch a weight muſt be laid upon his back or ſhoulder, as muſt render him incapable of giving any aſſiſtance. Beſides, as the whole force is applied in the direction of the traces of the hindmoſt horſe, it cannot have ſuch influence on the plough, as when a part of it is in a direction more horizontal. When a body is to be moved forward in any direction, the nearer that the direction of the force applied approaches to the direction of the body, it acts with greater influence. And therefore, as the plough moves horizontally, and as the direction of the united draught of a plough with the cattle yoked two abreaſt, is more horizontal than the direction of the draught in a plough with cattle yoked in a line, the ſame force applied will have greater influence.

When theſe two different ways of yoking cattle in ploughs are thus conſidered and compared together, it is difficult to determine which ought to be preferred. Each of the two ſeems preferable to the other in a certain ſituation. When the land is ſtiff and the labour ſevere, the yoking the cattle in pairs ſeems preferable, as it is certainly the ſtrongeſt draught; and when the land is wet, and in danger of being much hurt by the treading of the cattle, the yoking them in a line before each other ſeems preferable; as thereby they are confined to the bottom of the furrow, which is the firmeſt part of the land, and prevented from doing harm.

When a perſon uſes two or more ploughs, it is a very proper way to have one with the cattle yoked in a line, and the reſt with the cattle yoked in pairs. The ploughs with the cattle yoked in pairs continue as long as the land-cattle have room to go eaſily upon the firm land; and the plough with the cattle yoked in a line, follows, and clears up the furrows. In this way the cattle yoked in pairs do no damage, and the cattle yoked in a line are never uſed but where they are of real benefit.

To perſons that incline to yoke the cattle in a line before each other, it will not be amiſs to point out a way to remove the inconveniency laſt mentioned, and ſhow how the cattle may be yoked ſo as to lay no additional weight on the back or ſhoulders of the hindmoſt horſe, and to make the direction of the draught more horizontal. This is done by making the traces of the horſe next to the plough but one very long, and fixing them, not to the ſhoulders of the horſe behind him, but to the croſs-tree, and by fixing the traces of the horſe before him, not to his ſhoulders, but to his traces at the place were the back-rope is fixed. By this the hindmoſt horſe is delivered from the burden laid upon him in the other method, as his draught is entirely independent of that of the reſt. There is indeed ſome weight laid upon the horſe immediately before him, to whom the others are yoked. But this is but ſmall; for his traces are nearly in the ſame direction with theirs, and they are yoked to him at a place lower than his ſhoulders. By this, likewiſe, the direction of the united draught is more horizontal, when there are three or more horſes yoked: it is even more horizontal than when the cattle are yoked in pairs. In a four-horſe plough yoked in pairs the two forces are equal; but in a four-horſe plough, yoked in this manner, the force moſt horizontal is to the other, as three to one.

The thraces of the horſe hindmoſt but one being long, will incommode the hindmoſt horſe in turning, if they have nothing to ſupport them. To prevent this, two links muſt be fixed to the ſhoulders of the hindmoſt horſe, and the

traces paſſed through them; the links long enough to allow the traces to be ſtretched.

When two horſes are ſufficient for the draught, the yoking them in this manner deſcribed for the two hindmoſt, removes alſo the ſecond inconvenience mentioned, that attends the yoking cattle in a line: for the ploughman diſcerns, by the going of the plough, when any of them neglect their work, in the ſame manner as when there are four horſes in the plough yoked in pairs.

The ordinary method of yoking oxen, is attended not only with all the inconveniencies of yoking cattle in pairs, but alſo with the laſt-mentioned inconveniency, of yoking cattle in a line. For the ſoam, by which the foremoſt cattle draw, is fixed to the yoke of the hindmoſt pair. Their yoke being higher than the beam, a great weight is laid upon their necks by the drawing of the foremoſt cattle. This inconveniency may be removed, and the oxen yoked in ſuch a manner, as to give two directions to the plough, as is done when horſes are yoked in pairs; by which the draught will likewiſe be made ſtronger. To do this, the ſoam of the pair immediately before the hindmoſt muſt be fixed, not to their yoke, but to the beam; and, to prevent this ſoam from incommoding the hindmoſt in turning a link muſt be fixed to their yoke for it to paſs through, the link long enough to allow the ſoam to be fully ſtretched. When there are more than two pair in the plough, as is moſt common, the largeſt ſized cattle ſhould be placed next the plough, and the ſmalleſt-ſized immediately before them. For the lower that the yoke of theſe laſt is placed, the nearer will the direction of their ſoam be to the ſoam of thoſe before them; and thereby the leſs weight laid upon their necks. This method of placing the cattle is contrary to the ordinary way: for it may be obſerved that the ſmalleſt-ſized oxen are always placed next to the plough. But theſe different ways of placing the cattle are both founded upon the ſame reaſon: for the ſmalleſt ſized oxen are placed next the plough in the ordinary way of yoking, that ſo their yoke, to which the ſoam of the pair before them is fixed, may be as low as poſſible: for the lower that it is placed, the nearer the directions of the two ſoams approach each other, and the leſs weight is laid upon the necks of the hindmoſt pair. And, for the ſame reaſon, the loweſt-ſized oxen ſhould be placed in the middle, when yoked in the manner propoſed, that ſo they may be leſs incommoded by the pair before them.

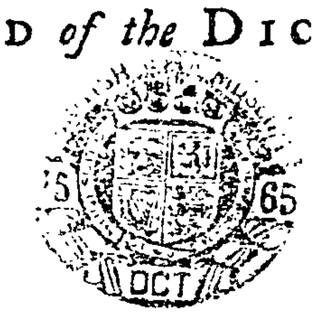
If, in conſidering the moſt proper method of yoking cattle in ploughs, we had nothing in view but the ſtrength of the draught, and conveniency of the cattle, we would always recommend the yoking the cattle in ſuch a way, as to apply two forces to the plough in different directions. But as we muſt alſo have in our view the going of the plough, hence it becomes neceſſary to obſerve, that ſometimes it is an advantage, to have the draught of the whole cattle in the ſame direction.

In ploughing lea, where the ſward is tough, or any kind of land, where there are interruptions from roots or the hardneſs of the bottom, the plough, if two forces are applied to it in different directions, goes very unſteadily, ſometimes too deep, and at other times too ſhallow, and is very difficult to manage. The reaſon is obvious: when the plough meets with ſuch interruptions, as tend to make it go deeper, or ſhallower, than its ordinary way of going; if at the ſame time, the force that acts contrary to the interruption ceaſes, then the plough, in ſpite of all the attention of the ploughman, will either ſtart out of the ground, or go in too deep, according to the tendency of the interruption. But when there is only one force acting upon the plough, it is, in ſome reſpect, like the wheeled plough; it goes ſteadily and at a certain depth; at leaſt, it is not ſo difficult to manage it, as when there are two forces acting in different directions: for though ſome of the cattle, at the time when the interruption is given, ſhould ceaſe to draw, yet the draught continues ſtill in the ſame direction, and the ploughman has only the alteration occaſioned by the interruption, to rectify. Every perſon knows, that an ox-plough goes much more ſteadily than a horſe-plough: and this is occaſioned, not only by the nature of the animals, oxen being more ſteady in drawing than horſes, but alſo by the manner of yoking them, oxen being yoked in ſuch a manner, as that one force only is applied to the plough.

Thus it appears, that no abſolute determination can be given, which of theſe two ways of yoking cattle in ploughs is to be preferred. Men muſt weigh the advantages and diſadvantages attending each way, and determine according to circumſtances. If the land is of a kind not eaſily ploughed, the cattle not well trained, and the ploughmen not expert, the work will be beſt performed, if there is only one force applied to the plough. But if the land is eaſily ploughed, that is, has few things in it to incommode the plough in going; if the cattle are well trained, and the ploughmen expert, the work will be well enough performed, and the labour leſs ſevere upon the cattle, if two forces are applied to the plough in different directions.

YOAK *of land*, the quantity of land which a yoak of oxen might plough in a day.

The END *of the* DICTIONARY.



THE

GARDENERS KALENDAR,

Calculated for the USE of

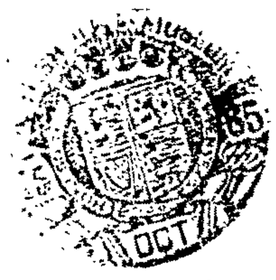
FARMERS and COUNTRY GENTLEMEN:

CONTAINING

An ample Account of the Work neceſſary to be done every Month in the Year, in the NURSERY, KITCHEN, FRUIT, and FLOWER GARDENS.

TOGETHER WITH

Full DIRECTIONS for performing EVERY NECESSARY OPERATION, according to the lateſt IMPROVEMENTS.


OCT
65

INTRODUCTION.

BEFORE we proceed to enumarate the work neceſſary to be done in the kitchen, fruit, and flower-gardens, as well as in the nurſery, it will be proper to give ſome directions for laying out theſe incloſures; conſider the nature of the ſoil beſt adapted to bring their reſpective products to perfection; and lay down a few cautions requiſite to enſure ſucceſs.

Neither the huſbandman, nor the country gentleman of moderate fortune, who prefers utility to oſtentatious ſhow, can ſet about an eaſier or more profitable branch of culture, than that of the kitchen and fruit garden, which may very properly be intermixed, and occupy one and the ſame ſpot of ground, ſince they both require a good deep ſoil, and nearly the ſame expoſure. The walls which incloſe the kitchen garden, in order to ſecure its product, will be extremely ſerviceable for fruit: and, if elegance ſhould be ſtudied, this united garden may ſtill be placed out of view from the dwelling-houſe.

The chief things to be conſidered in the choice of a ſpot of ground for a kitchen and fruit garden are, the ſituation, the ſoil, the conveniency of water, the extent moſt proper to be incloſed, and the manner of incloſing it, and laying it out.

If the huſbandman can chooſe his ſoil and ſituation for a garden, the former ſhould be rich, rather ſtiff than light, and conſiderably deep. Nor is a moderate degree of moiſture here by any means an objection. The ſituation ſhould be nearly level: becauſe heavy rains would waſh away the richeſt part of the mould, if the declivity were conſiderable. If he has not a level ſpot near his houſe, the ground intended for the garden may be made into flats with terraces ſupported by ſtrong walls, which will become uſeful for fruit trees. A gentle inclination may be preſerved, to anſwer Mr. Miller's idea of having one part of dry ground for early crops, and the lower part for late crops, in order that the kitchen may be the better ſupplied throughout the ſeaſon with the various ſorts of herbs, roots, &c.

He ſhould not be diſcouraged at ſome ſeeming diſadvantages to which his ſoil and ſituation may expoſe him; for no difficulty is ſo great, but that it may be overcome by care, induſtry, and preſeverance. Of this we have a ſtriking inſtance in the following part of a paper which D. J. Beal read to the Royal Society, ſome years ago, with a view to the improvement of gardening in Scotland.

"I had, ſays he, ſeveral conferences with Sir Robert Murray (who was an honour to his country, and a bleſſing to the place where he abode) concerning eſculent and olitory gardens, and (under one) nurſeries of fruit-trees, and other uſeful vegetable in Scotland. I repreſented, that, almoſt within my memory, they are become the chief relief of England; that auſtere fruit has been found to yield the ſtrong and ſprightly liquor which reſembles the wine of the grape; that the return of gain from gardens is great and ſpeedy; and that nurſeries are neither a chargeable nor a burthenſome addition, but a motive of encouragement to perſevere in the nobleſt kind of agriculture. Sir Robert granted all I ſaid: and I am ſure he executed all that he could for the benefit of his own country, and of this. But, ſaid he, there are ſo many rocks, and ſuch bleak winds, in Scotland, that it can hardly draw in the ſame yoke with England, for gardens and orchards. I replied, that in Devonſhire and Cornwall they fence their gardens and orchards with Flanders furze and tall holly, from the ſea winds; that they have lofty firs and goodly pines in Scotland; and that New England, where the winds are as keen, and the ſnow and froſt as deep, and as long laſting as in many parts of Scotland, is nevertheleſs full of fruitful orchards. And if Scotland be farther in the north, yet Norway is rich in boſcage; and the ſeeds of the hemlock, fir, ſpruce, and cedar, from New England, Newfoundland, and Virginia, may perhaps rejoice in the exchange of Northern America for the north of this iſland.

"This, I told Sir Robert, I durſt undertake; that when Edinburgh and their chief towns and univerſities ſhall plant kitchen gardens, as we do now in England, they ſhall receive their grateful reward the firſt year, and bear the charges of their nurſeries abundantly, and ſo hold on, and within ſeven years ſecure their poſterity of the beneſit, and delight themſelves with the fruit of their pleaſing labour.

"Now for fertilizing rocks, I made bold to repeat it often, that, within a day's journey of the heart of England, I could ſhew three gardens, the beſt that I have ſeen for flowery beauties, Engliſh ever-greens, and ſallads all the winter long; all theſe on a hard rock, in moſt places but one foot deep under earth, in ſome two, and in very few three, with very lofty hills cloſe to the ſouth ſide, the declivity of the gardens due north, and the rock perfectly bare next to the walls on the north ſide. I likewiſe ſaw rich hop yards in the ſame caſe, but in deeper ground, next to the garden on the ſouth ſide: and theſe northern hop yards eſcaped many blaſts, which ſeized on the hop yards on the ſouth ſide of the hill. On the ſteep aſcent on the north ſide of one of theſe rocky hills, where no plough could come, I ſaw a gentleman ploughing up the ſhallow turf with a hand-plough, for flax; and I ſaw good flax grow there, to the largeneſs of a village-field. His hand-plough had a ſtem of aſh, or ſally, about ſeven feet long, and a plate at one ſide near the end, to turn the turf; a coulter to be let out ſhorter or longer, to cut the turf four, five, or more inches deep, as the land permitted, and a ſmall iron wheel. This hand-plough the maſter and the man, by turns, drove before them, with a walking ſpeed; having leathern aprons before them, to ſave their cloaths. For the cauſes of this hardy fertility let philoſophers account. I am ſure of the truth of what I write.

"It is no hard taſk to ſhovel down the ſhallow and moſſy turf, from the deepeſt declivities of rocks, into places where it may have a receptacle or ſtay, and there, with the ſpade to mix and impregnate it with compoſt for

for gardens or vineyards. There too the tenth part of an acre in gardening may yield more profit, than ten acres of ordinary tillage in a corn field." *Philoſophical Tranſactions*, numb. 116.

On the other hand we have many proofs that wet, and even very marſhy grounds, have been converted into excellent kitchen gardens, after they have been drained. Such was, formerly, all that large part of Paris which ſtill retains the name of *le marais* (the marſh;) and ſuch were, evidently, ſeveral of our moſt profitable gardens around London. The marquis of Turbilly has given us farther inſtances of this truth in ſeveral of his noble improvements; and the Memoirs of the truly patriotic Society of Berne remark very juſtly, that all legumes and pot herbs thrive perfectly well in the black, rich, moiſt, and ſomewhat riſing grounds, which moſt commonly ſkirt the borders of marſhes.

As warmth is eſſentially neceſſary to a garden, it is adviſable that the expoſure of the ground intended for this purpoſe be to the ſouth-eaſt or ſouth; and that it be protected from the north and north-eaſt either by high grounds, or plantations of loſty trees at a ſmall diſtance. Fruit-trees require to be likewiſe protected from the ſouth-weſt and weſt, which are apt, in the autumn, to ſhake the fruit.

The huſbandman ſhould here ſpare no trouble or expence to render his ſoil of a proper quality and depth: and if it be not naturally ſo, he muſt have recourſe to one or other of the methods practiſed for the improvement of ſoils, according to the nature of his ground.

Whatever the ſoil be, the mould in which the plants are to live and thrive, ſhould be deep enough to afford their roots full room to extend themſelves. It appears by ſeveral experiments, that the roots of many plants, not excepting even annuals, pierce to the depth of eighteen inches and more. To allow therefore a ſufficiency of room, though perhaps more than may be really wanted, a depth of three feet of good mould ſhould be allotted them here: and if the ſoil underneath is clay, or retentive of water, which would be apt to chill the roots of plants, it will be right to exceed even this depth.

Trenching is the moſt effectual way to obtain a conſiderable depth of well looſened mould. The common method of doing this, when the ſoil underneath is clay, is to begin with digging a trench four or five feet wide, either along or acroſs the whole ground; then to lay in the bottom of it, about half a foot thick, long dung, fern, leaves of trees, rotten ſticks, weeds, or any other ſuch like traſh, to rot and keep the ſoil from binding; then to fill this up with the earth dug out of the next adjoining trench, laying uppermoſt the ſpits that were loweſt, and ſo to continue till the work is finiſhed, without ever going deeper than juſt to the clay, though the ſurface be never ſo ſhallow. But if the clay be dug into, and part of it be turned up and mixed with the other earth, its bad qualities will ſoon be corrected by the influences of the air, rain, and one winter's froſts; it will become good and fertile mould, and the depth of the ſtaple will be increaſed thereby, eſpecially with the addition of a little drift ſand, coal, or other aſhes. The beſt time for trenching of land, that it may receive the benefit of being well mellowed, is the beginning of winter; when alſo, being moiſt, it is eaſy to dig.

When the mold on the ſurface is but ſhallow, and lies on a bed of ſand, gravel or looſe earth, it will be adviſable to lay a layer of ſtiff earth, inclining to clay, at the bottom of the trench. This will be more eſpecially neceſſary for the growth of trees, or plants whoſe roots naturally pierce deep: for by means of this earth, thoſe roots will ſpread horizontally in the mould, inſtead of ſtriking down, as they would otherwiſe do, into barren earth, which would immediately make the trees decay and become ſtinted. And another advantage attending this method will be, that as water cannot ſo eaſily deſcend through this ſtiffer ſoil, the earth will be thereby preſerved in a ſo much moiſter ſtate; yet even here the clay ſhould not be ſuch as is impervious to water; for this, unleſs it lie very deep, would be attended with as bad conſequences as the other extreme.

The general practice of gardeners is regularly to trench their ground, and lay it rough in the winter, without ſufficiently conſidering the quality of the ſoil, or the nature of the earth which lies underneath. But a little reflection would convince them of their error. Let us, in this light, ſee what is the effect of trenching various ſoils. If the ground is naturally light, and lies on a bed of ſand or gravel, it is to be feared that every ſubſtance brought to improve the ſoil, together with its fineſt and richeſt particles, will be carried down into that ſand or gravel. Does not too frequent trenching contribute to this loſs? as does likewiſe laying the ſurface rough in the winter: for the rains waſh the finer mould into the hollow places, from whence the depth of the ſoil being leaſt there, it is moſt readily carried down into the looſe earth underneath. If the ſoil underneath is ſtiff, frequent trenching is proper in order to bring back to the ſurface the rich mould that has been waſhed down: and if it be naturally ſtrong, the laying of it rough in the winter is an advantage, becauſe the winter's froſts will moulder its tough ſtrong particles.

This method of preparing the ground is, undoubtedly, expenſive: but its fertility afterwards will yield an ample reward.

Plenty of water is abſolutely neceſſary in this garden, and therefore great care ſhould be taken to provide it, in ſuch manner that it may be come at as eaſily as poſſible. If a ſufficient ſupply of it can be obtained from the neighbouring grounds, two or three baſons ſhould be made in different parts of the garden, if it be a large one; for when the water is to be carried to a conſiderable diſtance, the expence attending this neceſſary buſineſs will be great, and there will be danger of the plants ſuffering for want of it; labourers being very ſparing of their work, eſpecially when it is toilſome, unleſs they are well looked after. The ſize of theſe baſons ſhould be proportioned to the quantity of water that will be wanted, or with which they can be ſupplied: but their depth ſhould not exceed four feet, for fear of accidents, if people ſhould chance to fall into them: beſides which, deep water is not ſo well warmed and tempered with the ſun and air, as when it is ſhallow.

The methods uſed for collecting and preſerving of water in ponds or reſervoirs in the field, are equally applicable to the making and repleniſhing of theſe baſons in the garden. But it will be proper here to add the following more particular cautions and inſtructions of Mr. Miller, who, after obſerving, that the beſt time of the year

year for lining theſe baſons with clay, particularly in looſe or ſandy land, and for afterwards covering that clay with a thick layer of courſe gravel, is in autumn, when the ſun is declining, and the weather temperate, adviſes, "as a farther means of ſecuring this clay from being cracked by the heat of the ſun, or by froſt, to lay upon the rim or top of it, around the ſides of the baſon, a ſtratum of ſand, then a ſtratum of good earth, and upon this a layer of thick turf. The graſs thus laid will root in the mould underneath, and bind the whole firmly together: and it ſhould be laid as far down the inſide of the baſon, as the water is apt to ſhrink to, that no part of the clay may be wholly expoſed to the weather.

"No trees or ſhrubs ſhould be ſuffered to grow near theſe baſons, leſt their roots ſhould penetrate into them, and thereby occaſion holes through which the water would find an eaſy paſſage. Neither ſhould theſe reſervoirs be made near to tall trees, becauſe the ſhaking of them, by violent winds, would be apt to looſen and crack the clay.

"In countries where clay proper for this purpoſe cannot be eaſily had, theſe baſons are frequently lined with chalk beaten into fine powder, and made into a ſort of mortar, which is rammed down and worked very hard and firm all over their inſide. This cement holds water very well, if the pond be not ſuffered to remain too long dry: for when this happens, the ſun and wind are apt to crack the chalk, and theſe cracks generally extend through its whole thickneſs, ſo as to let out the water.

"Some line theſe ponds with bricks laid in terras, which is a good method where the ground is very looſe and ſandy; becauſe when theſe walls are well built, the furrounding earth may be rammed down cloſe to them, ſo as to prevent its falling away, or ſettling from them. But, as heat is apt to crack the terras, no part of this lining ſhould be left long dry and expoſed.

"Others again uſe for this purpoſe a cement of powdered tile and lime, two thirds of the former to one third of the latter, beaten well together, and worked up with but little water: for the ſtiffer it is, and the more it has been beaten, the better it will be. With this cement they cover the ſurface of the walls of baſons about two inches thick, laying it very ſmooth, and taking great care that no ſticks, ſtraws, or ſtones be mixed with it. This is generally done in dry weather; and as ſoon as the whole inſide of the baſon has been plaſtered in this manner, it is rubbed over with oil or bullock's blood, and the water is let in immediately after. This cement has the property of hardening under water, ſo as to be equal to ſtone; and it will continue as long ſound."

Where a ſupply of water for baſons and ponds cannot be obtained, wells muſt be dug; and it is generally adviſed, that the water taken out of them be expoſed to the ſun and air for ſome time, before it is uſed, becauſe, ſays Mr. Miller, the rawneſs of this water, when freſh drawn, is not agreeable to the growth of vegetables.

The ſize of this garden ſhould be in proportion to the wants of the family; but with a much larger allowance of ground than is uſually allotted, in order that the plants may be benefited by ſtirring the earth between them whilſt they grow. The great and manifeſt advantages of this practice, eſpecially in the culture of pulſe and garden plants, have been ſo evidently ſhewn by numbers of experiments related in the former parts of this work, that we cannot but again recommend it here as an object of high importance.

It ſhould be incloſed with a wall, either of brick or ſtone; but brick is beſt, for the greater conveniency of nailing up the fruit-trees which are to be planted againſt it. The thickneſs of theſe walls ſhould be proportioned to their height, which ſome run up to twelve or fourteen feet, or more: but nine or ten will be enough for almoſt any kind of fruit; and in this caſe thirteen inches, that is to ſay, a brick and a half, will be a ſufficient thickneſs; though two bricks will be better, for duration. Their inſide ſhould be built as ſmooth as poſſible, and, to ſtrengthen them againſt high winds, piers ſhould be run up with them, at the diſtance of about twelve or fourteen feet from each other, according to the uſual extent of the fruit-trees for which they are intended. As to pears, which ſpread very wide, and frequently grow much above the height here mentioned, they do not require the aſſiſtance of a wall; unleſs it be ſome of the lateſt winter ſorts, and theſe the curious, who will be at the expence, may plant againſt walls built on purpoſe for them. Theſe piers may project ſix or eight inches on the outſide of the wall, for the ſake of greater ſolidity; and they ſhould advance about four inches on the inſide, for the convenience of fixing to them trelliſes, by building the wall on arches; and planting the trees at thoſe arched places, as Mr. Hitt adviſes, the trees will be thereby enabled to extend their roots underneath the wall; which will prove very advantageous to their growth.

If the quantity of walling which ſurrounds the kitchen garden be too little to furniſh the deſired ſupply of fruit, a croſs wall may be built through the middle of this ground; or, where the ſize of the garden will admit of it, there may be two croſs walls: but theſe walls muſt not, by any means, be leſs than eighty or a hundred feet aſunder. More will be yet better.

Mr. Miller is clearly of opinion that the beſt aſpect for walls in England, is to have one point to the eaſtward of the ſouth; becauſe theſe will enjoy the benefit of the morning ſun, and be leſs expoſed to the weſt and ſouth-weſt winds (which are very injurious to fruits in this country) than thoſe which are built due ſouth. "I know, ſays he, that many perſons object to the turning of walls the leaſt point to the eaſt, on account of the blights which they think come from that quarter in the ſpring; but from many years experience and obſervation, I can affirm, that blights as often attack thoſe walls which are open to the ſouth-weſt, as thoſe which are built to any other aſpect; and I believe thoſe who will be at the trouble of obſerving for ſeven years, which aſpected walls ſuffer moſt from blights, will find thoſe which are built with a point to the eaſtward of the ſouth, as ſeldom blighted as thoſe which are turned to any other aſpect; therefore in the contrivance of a kitchen garden, there ſhould be as great a length of theſe walls built as the ſituation of the ground will admit.

"The next beſt aſpect is due ſouth; and the next to that ſouth-eaſt, which is preferable to the ſouth weſt, for the reaſons before aſſigned: but as there will, for the moſt part, be ſouth-weſt and weſt walls in every garden, theſe may be planted with fruits which do not require ſo much heat to ripen them, as thoſe deſigned

for the beſt walls; but wherever there are north walls, thoſe will only be proper for baking-pears, plums, and morello cherries for preſerving; or ſome duke cherries may be planted againſt theſe walls, to ſupply the table till peaches, nectarines, and plums are ripe."

In whatever manner the walls are made, this garden ſhould be well ſheltered from the north and north-eaſt, by a diſtant plantation of high timber-trees, if nature has not otherwiſe provided a ſufficient defence from thoſe quarters.

In the diſtribution of this garden, particular care ſhould be taken to lay the walks out ſo as to obtain the greateſt convenience that can be for ſupplying each part of it with manure and water, and as eaſy acceſs as poſſible to its different quarters, which may be ſurrounded by a border planted with eſpaliers. The manner of forming eſpaliers will be directed when we come to ſpeak of the training of fruit trees.

Theſe walks ſhould be firm enough to bear at leaſt the weight of a loaded wheel-barrow, and wide enough for the convenient carriage of whatever there may be occaſion to bring into this garden, or to carry out of it. Mr. Miller is againſt making them of gravel; becauſe, as it will very often be neceſſary to wheel manure, water, &c. upon them, they would ſoon be torn up and rendered unſightly; unleſs care be taken that the wheel be broad; or rather that it be a roller as wide as the diſtance between the ſides of the weel-barrow.

For the ſame reaſon he rightly condemns turf-walks here, and adviſes, as the beſt for a kitchen garden, thoſe which are laid with a binding ſand. In effect, theſe are the eaſieſt kept of any: for when either weeds or moſs begin to grow, ſcuffling of them over with a Dutch hoe in dry weather, and raking them over a day or two after, will render them as clean as when they were firſt laid: or if they are covered with duſt taken from great roads, this will bind and become very firm.

If the ſoil is ſtiff and apt to retain water, narrow underground drains ſhould be made by the ſides of the walks, to carry off that wet: and where the ground is naturally moiſt, lime rubbiſh, flints, chalk, or any other ſuch material as can be procured with the leaſt expence, ſhould be laid at the bottom of theſe walks; or if neither of theſe can be had, the ſand ſhould be laid thick upon a bed of heath or furze, and the water will drain through this, ſo that the walks will be firm and good in all ſeaſons.

The ſame means will alſo help greatly to drain away the ſuperfluous moiſture of the whole ground, if the ſoil ſhould be naturally too wet; for if they are not ſufficient, more under-ground drains may be made acroſs different parts of the garden, according to its declivity: for moſt kitchen plants are hurt by too much moiſture in winter; and trees never produce good fruit when their roots lie in water.

If each quarter of the kitchen garden is to be encompaſſed by eſpaliers, the walks which divide thoſe quarters ſhould be wide enough to afford admittance to the warmth of the ſun, and to a free current of air. In this caſe they may be, as Mr. Miller directs, ſix feet wide in ſmall gardens, and ten or twelve in extenſive grounds. On each ſide of theſe walks, the eſpalier ſhould be planted in a border four or five feet wide; by which means the two eſpaliers will be far enough aſunder for their roots never to injure one another. Theſe borders may be ſown with ſmall ſallading, or any other herbs that do not continue long or root deep; ſo that no ground need be loſt, and the continual ſtirring and manuring of it for theſe productions will be of great ſervice to the roots of the trees.

The borders along the ſouth and other walls that have a good expoſure ſhould, in the opinion of this experienced gardener, be at leaſt eight or ten feet wide, in order to allow the roots of the fruit trees that are planted againſt them full room to extend themſelves. Such of theſe as face the ſouth may be ſown for early crops of plants which do not root deep, and thoſe that are expoſed to he north will do for late crops: but no deep rooting plant, eſpecially peaſe and beans, ſhould ever be placed too near the trees; though moſt gardeners are apt to tranſgreſs greatly in this reſpect, as well to preſerve their crops in winter, as to bring them forward in the ſpring: both which ends might be anſwered equally well, and without prejudice to their fruit-trees, by making reed hedges in ſome of the warmeſt quarters, and ſowing cloſe to them their early peaſe, beans, &c. if ſuch fences are found to anſwer the purpoſe of forwarding their growth.

It is a general opinion, that plants which are ſheltered by walls, ſo as to be defended from nipping winds, and to have the additional warmth of the reflected heat of the wall, are leaſt liable to be deſtroyed by the winter's froſts; for which reaſon it is that early crops are moſt commonly in borders ſo ſituated. The ſun will undoubtedly give greater motion to the ſap of plants there, and they may, for this reaſon, ſeem to be the ſtronger. But if we conſider, that the walls yield no protection againſt the ſeverity of the night's froſt, and that the effect of this froſt muſt be moſt ſeverely felt by plants whoſe ſap is in the greateſt motion, we may rather fear that this ſituation, inſtead of being beneficial, may, in fact, counter-act the very end propoſed. To be ſatisfied of this fact, a gentleman ſowed ſome early peaſe in a border at the foot of a ſouth wall, and at the ſame time ſome others, of the ſame ſort, in an open field adjacent to the garden; and he found, that the latter were by much the leaſt damaged by the winter's froſts; nor did he perceive any great difference in the ſeaſon of their blooming.

A ſquare or an oblong form will be moſt agreeable to the eye: but it matters not, in other reſpects, what ſhape this garden is of; eſpecially as all groſs irregularities may eaſily be hid in the laying of it out. Thus, when this is done, any of the ſlips cut off by the garden wall, may, if large enough, and well expoſed to ſun, be ſet apart for a place to make hot beds for early cucumbers, melons, &c. One would wiſh this ſpot to be as near as poſſible to the ſtables, for the convenience of ſupplying it with dung; and to have it without the wall is certainly moſt eligible, becauſe that will ſave a great deal of filth and litter in the garden, and remove from the noſe and eye an object which is not of the moſt pleaſing kind. If this ſlip is long enough to admit of an annual ſucceſſion of new beds during two or three years, they will be much better than when they are continued more than one year on the ſame ſpot; and as it will be abſolutely neceſſary to fence this melon ground, as it is called, round with a reed hedge, this may be ſo contrived as to be moved away in panncls, in ſuch manner that there will be no occaſion to ſhift any

thing

thing more than one of the croſs partitions, or fences, each year.

The importance of the precept particularly here, will juſtify our mentioning again, that the dunghill, ſet apart for this, or for any other purpoſe of gardening or agriculture, ſhould be carefully kept clear from weeds: for if weeds are ſuffered to ſcatter their ſeeds upon the dung, they will be brought into the garden or other cultivated ground, ſhoot up, damage every crop of uſeful plants, and occaſion a perpetual labour to extirpate them.

Another caution given by Mr. Miller, as abſolutely neceſſary to be obſerved, is, to carry off all the refuſe leaves and ſtumps of cabbages, the ſtalks of beans, and haulm of peaſe, as ſoon as they have done bearing; for the ill ſcent which moſt people complain of in kitchen gardens, is wholly occaſioned by thoſe things being ſuffered to rot upon the ground. The leaves of cabbages may be given to hogs or other animals, while they are freſh, and the reſt of the traſh may be thrown upon the dunghill, which it will help to enrich; or ſuch as will keep may be preſerved, to be thrown in the bottom of trenches, in that part of the garden which is to be trenched the following autumn.

And here we cannot help pointing out a neglect too common among gardeners, we mean, the letting their plants remain on the ground till they have ripened their ſeeds, and wither: not conſidering that whilſt a plant is in full ſap, it preſerves the earth in a looſe ſtate, probably by means of the moiſture perſpired from its roots; but if permitted to ſtand till its ſeed is ripe, or the plant withers, it leaves the impoveriſhed earth dry and hard, being itſelf become entirely void of ſap.

The moſt important points of general culture here conſiſts in good digging, keeping the ground clean, manuring the ſoil, and allowing proper diſtances between the plants, according to their ſeveral kinds and growth.

The kitchen garden, if it be rightly managed, is the moſt uſeful and profitable ſpot of ground that either the country gentleman or farmer can cultivate. It is indiſpenſibly neceſſary to every family in the country, where the neareſt market-town is generally at too great a diſtance, and, at the ſame time, too poorly furniſhed with plants and roots, to afford a proper ſupply.

We ſhall conclude our obſervations on the kitchen garden, with laying down two rules neceſſary to be obſerved. 1. Never let the ground be crowded with more plants than it is able to nouriſh properly. 2. Never let any part of it remain unoccupied, for want of a due ſucceſſion of crops. By this means the maſter, whom we would adviſe to be always his own gardener, at leaſt ſo far as perſonally to direct and ſuperintend the whole management, may have his table conſtantly ſupplied with ſuch vegetables as he likes beſt; no part of his ground will lie uſeleſs, and each of its productions will be brought to perfection.

We have already obſerved, that the kitchen and fruit-gardens may very properly be intermixed, and occupy the ſame ſpot of ground. But notwithſtanding this, their various productions will require a very different treatment, though in the ſame incloſure: we ſhall therefore now proceed to conſider the latter, more particularly with regard to the method that ſhould be obſerved.

Making Borders for Peaches, Nectarines, Plums, Pears, Cherries, &c.

If the land be a ſtrong clay, take ſea ſand, if it may be eaſily had, if not any other ſand that is neareſt, and about one ſixth of the quantity of coal aſhes, that has been kept very dry; riddle them, but not too fine: for if ſome of the larger parts be left, they will diſunite the tough body of clay, make it more open and tender, and the finer parts that are more burnt, will increaſe its ſalts.

But if aſhes cannot be had, let one twelfth part of lime be added to the ſand. About one third part of the depth of the border ought to conſiſt of theſe ingredients; and in trenching the borders, there muſt be a layer of theſe, and a layer of the natural ſoil, from the bottom to the ſurface, in the above proportion, well mixt together.

If the ſoil of the borders be mixed with large pebbles, they muſt be picked out, and laid in the drains, where they will be uſeful. And as this kind of ſoil is generally of a looſe ſandy nature, it muſt be mixed with ſomething more ſtrong and binding, namely with clay, the tougheſt that can be got near the place. If it be taken from ditches whoſe ſoil is naturally a clay, or from ditches where there is ſometimes a current of water from arable fields of the ſame kind of ſoil, and there leaves its ſediment, it will anſwer the purpoſe very well.

At the bottom of the borders lay this clay ſix inches thick throughout, which will prevent the moiſture running out too faſt in the ſummer, as it is too apt to do in ſandy ground, eſpecially where there are proper drains made. When you have laid down the clay, and by that means formed a ſound bottom, let a ſufficient quantity of the clay be procured, and to each cart-load of the clay let there be added an equal quantity of the natural ſoil, three pecks of lime, or rather pigeons dung, and five of ſoot, and the whole well mixed together: if coal or wood-aſhes be uſed inſtead of ſoot, they muſt be made very fine, otherwiſe they will open this kind of ſoil too much; beſides, the finer they are made by burning, the more they will enrich the ground by ſalts.

If the borders are to be planted with trees where others have grown before, the depth and quality of the ſoil muſt be examined; and if it be deep enough, and compoſed of a mixture of ſand and clay, it will require to be trenched only, to draw off the too great quantity of moiſture, and a proper addition of lime or ſoot to be mixed with the ſoil.

But if the borders are deſigned for vines and figs, the natural ſoil ſhould be mixed with rubbiſh, as lime ſcraps, ſmall pieces of bricks, &c. for a foot deep at the bottom or more; for both the vine and fig-tree proſper beſt, and yield the fineſt fruit, in a dry ſoil, with a rock near the ſurface. If the land be ſandy, the lime ſcraps, &c. may be omitted, and only the ſoot, &c. added, as before directed.

It will be neceſſary to obſerve in trenching all borders, to pick out all the roots of bindweed, common thiſtle, and all other weeds whoſe roots ſtrike deep into the earth; but the roots of couch-graſs, &c. which run near the ſurface, may be buried at the bottom of the trenches, which will effectually deſtroy them without any further trouble.

When theſe, or, indeed, any borders are firſt made, they ſhould be raiſed three or four inches above the height they are deſigned to continue; for they will ſettle ſo much, at leaſt, in a year's time. Thoſe which are ten feet broad, let them have a deſcent of ſix inches from the wall, and others in proportion to their breadth: four feet broad will be ſufficient for borders made for vines only.

The FLOWER *or* PLEASURE-GARDEN.

The flower-garden being intended ſolely for ornament and pleaſure, a ſhort account only of it will be given here, as the principle deſign of this work is utility.

The flower-garden ſhould be made near the back-front of the houſe, from whence a deſcent of ſix or ſeven ſteps will finely embelliſh the whole. Proper room ſhould be allowed for a lawn of ſufficient extent, which, if it be the firſt object that ſtrikes the ſight, will have a very pleaſing effect.

Mr. Miller very juſtly obſerves, that the great art of laying out gardens for pleaſure, conſiſts in adapting their ſeveral parts to the natural poſition of the ground, ſo as to have as little earth as poſſible to remove, which is often one of the greateſt expences that attends the making of gardens.

The boundaries of theſe gardens, whatever they are fenced with, ſhould be carefully concealed with plantations of flowering ſhrubs, intermixed with laurels and other ever-greens to cover the fences, which have a diſagreeable appearance, when they are left naked and expoſed. Nor ſhould all the boundaries be ſeen from any one point of view; and if the country around affords a variety of pleaſing proſpects, it will be right to bound the pleaſure-garden with an ha ha ditch and wall, to lay theſe views open to ſight.

The NURSERY.

It is not our intention here to ſpeak of thoſe large and extenſive nurſeries, where all kinds of plants, trees, and ſhrubs, are raiſed for ſale; but a nurſery that is abſolutely neceſſary for ſuch country gentlemen as are deſirous of raiſing plants, trees, &c. for themſelves. Two or three acres of land employed this way may well be ſufficient for the moſt extenſive deſigns; and one acre will be full enough for thoſe of moderate extent. And ſuch a ſpot of ground may be always employed for ſowing the ſeeds of foreign trees and plants; and alſo for raiſing many ſorts of biennial and perennial flowers, to tranſplant into the borders of the pleaſure-garden; and for raſing many kinds of bulbous-rooted flowers from ſeeds, whereby a variety of new ſorts may be obtained annually, which will ſufficiently compenſate for the trouble and expenſe; and, at the ſame time, afford a very agreeable entertainment to gentlemen who are fond of theſe innocent amuſements.

Such a nurſery as this ſhould be conveniently ſituated for water; for where that is wanting, a neceſſary expenſe will be incurred by the carriage of it in dry weather. It ſhould alſo be as near the houſe as can conveniently be admitted, in order to render it eaſy to viſit at all times of the year; becauſe it is abſolutely neceſſary that it ſhould be under the inſpection of the maſter, who muſt delight in it, or there will be very little hopes of ſucceſs. The ſoil of this nurſery ſhould alſo be good, and not heavy and ſtiff; for ſuch land will be very improper for ſowing moſt ſorts of ſeeds; becauſe, as this will retain the moiſture in the ſpring and winter, ſo the ſeeds of moſt tender things, eſpecially thoſe of flowers, will, if ſown early, rot in the ground. Therefore, where perſons are confined to ſuch land, a good quantity of ſand, aſhes, and other light manures, ſhould be buried, in order to ſeparate the parts, and pulveriſe the ground; and if it be thrown up in ridges to receive the froſt in winter, it will be of great ſervice to it; as will alſo the frequent forking or ſtirring of the ground, both before and after it is planted.

Let the ground be always kept free from weeds; for if theſe are permitted to grow, they will rob the young trees of their nouriſhment. Another principal caution is to dig the ground between the young plants at leaſt once a year, to looſen it, and give room for the young fibres of the roots to ſtrike out. But if the ground be ſtiff, it will be the better if the digging be repeated twice a year, viz. in October and March; which will at once promote the growth of the plants, and prepare the roots for tranſplanting.

The part intended for the flower-nurſery ſhould be well ſituated to the ſun, and defended from ſtrong winds by plantations of trees, or buildings: at the ſame time the ſoil ſhould be light and dry, which muſt always be obſerved, eſpecially for bulbous-rooted flowers.

In this nurſery the off-ſets of all bulbous-rooted flowers, ſeedling auriculas, polianthuſes, anemonies, carnations, &c. ſhould be planted, and continue there, till they become blowing roots, when they ſhould be removed into the pleaſure-garden.

You may alſo, in this ground, raiſe the ſeveral ſorts of bulbous-rooted flowers from ſeeds, by which means new varieties may be obtained; but moſt people are diſcouraged from ſetting about this work, from the length of the time before the ſeedlings will come to flower: but it ſhould be remembered, that after a perſon has once begun, and conſtantly continued ſowing every year, after the parcel firſt ſown has flowered, the regular ſucceſſion of them coming annually to flower, will not render this method ſo tedious as it at firſt appears.

ORCHARD.

It is a rule among gardeners, that thoſe orchards thrive beſt which lie open to the ſouth, ſouth-weſt, and ſouth-eaſt, being ſcreened from the north, and have the ſoil dry and deep.

In planting of an orchard, great care ſhould be had to the nature of the ſoil, that ſuch trees as are adapted to grow upon the ground intended to be planted may be choſen, otherwiſe there can be little hopes of their ſucceeding; and it is for want of rightly obſerving this method, that we ſee, in many countries, orchards planted which never arrive to any tolerable degree of perfection, their trees ſtarving, and their bodies either covered with moſs, or the bark cracks and divides; both which are evident ſigns of the weakneſs of the trees; whereas, if inſtead of apples, the orchard had been planted with pears, cherries, or any other ſort of

of fruit to which the ſoil had been adapted, the trees might have grown very well, and produced great quantities of fruit.

As to the poſition of the orchard, if you are at full liberty to chuſe, a riſing ground, open to the ſouth-eaſt, is to be preferred; but we would by no means adviſe to plant upon the ſide of an hill, where the declivity is very great; for in ſuch places the great rains commonly waſh down the better part of the ground, whereby the trees would be deprived of proper nouriſhment; but where the riſe is gentle, it is of great advantage to the trees, by admitting the ſun and air between them, better than it can upon an entire level; which is an exceeding benefit to the fruit, by diſſipating fogs, and drying up the damps, which, when detained among the trees, mix with the air, and render it rancid: if it be defended from the weſt, north, and eaſt winds, it will alſo render this ſituation ſtill more advantageous; for it is chiefly from theſe quarters that fruit-trees receive the greateſt injury: therefore, if the place be not naturally defended from theſe by riſing hills, which is always to be preferred, then you ſhould plant large growing timber-trees at ſome diſtance from the orchard, to anſwer this purpoſe.

You ſhould alſo have a great regard to the diſtance of planting the trees, which is what few people have rightly conſidered: for if you plant them too cloſe, they will be liable to blights; and the air, being hereby pent in amongſt them, will cauſe the fruit to be ill-taſted, having a great quantity of damp vapours from the perſpiration of the trees, and the exhalations from the earth mixt with it, which will be imbibed by the fruit, and render their juices crude and unwholeſome.

Wherefore we cannot but recommend the method which has been lately practiſed by ſome particular gentlemen with very great ſucceſs; and that is, to plant the trees fourſcore feet aſunder, but not in regular rows. The ground between the trees they plough and ſow with wheat and other crops, in the ſame manner as if it were clear from the trees; and they obſerve their crops to be full as good as thoſe quite expoſed, except juſt under each tree, when they are grown large, and afford a great ſhade; and, by thus ploughing and tilling the ground, the trees are rendered more vigorous and healthy, ſcarcely ever having any moſs, or other marks of poverty, and will abide much longer, and produce better fruit.

If the ground in which you intend to plant an orchard has been paſture for ſome years, then you ſhould plough in the green ſward the ſpring before you plant the trees: and, if you will permit it to lie a ſummer fallow, it will greatly mend it, provided you ſtir it two or three times, to rot the ſward of graſs, and prevent weeds growing thereon.

At Michaelmas you ſhould plough it pretty deep, in order to make it looſe for the roots of the trees, which ſhould be planted thereon in October, provided the ſoil be dry; but if it be moiſt, the beginning of March will be a better ſeaſon.

When you have finiſhed planting the trees, you ſhould provide ſome ſtakes to ſupport them, otherwiſe the wind will blow them out of the ground; which will do them much injury, eſpecially if they have been planted ſome time; for, the ground at that ſeaſon being warm, and for the moſt part moiſt, the trees will very ſoon puſh out a great number of young fibres: which if broken off by their being diſplaced, will greatly retard the growth of them.

In the ſpring following, if the ſeaſon ſhould prove dry, you ſhould cut a quantity of green turf, which muſt be laid upon the ſurface of the ground about their roots, turning the graſs downward; which will prevent the ſun and wind from drying the ground, whereby a great expenſe of watering will be ſaved: and, after the firſt year, they will be out of danger, provided they have taken well.

Whenever you plough the ground between theſe trees, you muſt be careful not to go too deep among their roots, leſt you ſhould cut them off, which would greatly damage the trees: but, if you do it cautiouſly, the ſtirring of the ſurface of the ground will be of great benefit to them; though you ſhould obſerve never to ſow too near the trees, nor ſuffer any great rooting weeds to grow about them, which would exhauſt the goodneſs of the ſoil, and ſtarve them.

If, after the turf which was laid round the trees be rooted you dig it in gently about the roots, it will greatly encourage them. There are ſome perſons who plant many ſorts of fruits, together in the ſame orchard, mixing the trees alternately; but this is a method which ſhould always be avoided; for hereby there will be a very great difference in the growth of the trees, which will not only render them unſightly, but alſo the fruit upon the lower trees ill taſted, by the tall ones overſhadowing them; ſo that, if you are determined to plant ſeveral ſorts of fruits on the ſame ſpot, you ſhould obſerve to place the largeſt growing trees backwards, and ſo proceed to thoſe of leſs growth, continuing the ſame method quite through the whole plantation; whereby it will appear at a diſtance in a regular ſlope, and the ſun and air will more equally paſs through the whole orchard, that every tree may have an equal benefit therefrom.

The ſoil of your orchard ought to be mended once in two or three years with dung, or other manure, which will be abſolutely neceſſary for the crops ſown between; ſo that where perſons are not inclinable to help their orchard, where the expenſe of manure is pretty great; yet, as there is a crop expected from the ground beſides the fruit, they will the more readily be at the charge upon that account.

In making choice of trees for an orchard, you ſhould always obſerve to procure them from a ſoil nearly a-kin to that where they are to be planted, or rather poorer; for, if you have them from a very rich ſoil, and that wherein you plant them is but indifferent, they will not thrive well, eſpecially for four or five years after planting; ſo that it is a very wrong practice to make the nurſery, where young trees are raiſed, very rich, when the trees are deſigned for a middling or poor ſoil. The trees ſhould alſo be young and thriving; for, whatever ſome perſons may adviſe to the contrary, yet it has always been obſerved, that though large trees may grow, and produce fruit, after being removed, they never make ſo good trees, nor are ſo long-lived, as thoſe which are planted while young.

Theſe trees, after they are planted out, will require no other pruning but only to cut out dead branches, or

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ſuch as croſs each other, ſo as to render their heads confuſed and unſightly: the too often pruning them, or ſhortening their branches, is very injurious; eſpecially to cherries and ſtone-fruit, which will gum prodigiouſly, and decay in ſuch places where they are cut: and the apples and pears, which are not of ſo nice a nature, will produce a greater quantity of lateral branches, which will fill the heads of the trees with weak ſhoots, whenever their branches are thus ſhortened: and many times the fruit is thereby cut off, which, on many ſorts of fruit-trees, is firſt produced at the extremity of their ſhoots.

It may, perhaps, ſeem ſtrange to ſome perſons, that we ſhould recommend the allowing ſo much diſtance to the trees in an orchard, becauſe a ſmall piece of ground will admit of very few trees, when planted in this method: but they will pleaſe to obſerve, that, when the trees are grown up, they will produce a great deal more fruit than twice the number when planted cloſe, and will be vaſtly better taſted; the trees, when placed at a large diſtance, being never ſo much in danger of blighting as in cloſe plantations, as hath been obſerved in Herefordſhire, the great country for orchards, where they find that when orchards are ſo planted or ſituated, that the air is pent up amongſt the trees, the vapours which ariſe from the damp of the ground, and the perſpiration of the trees, collect the heat of the ſun, and reflect it in ſteams ſo as to cauſe what they call a fire-blaſt, which is the moſt hurtful to their fruit; and this is moſt frequent where the orchards are open to the ſouth ſun.

But, as orchards ſhould never be planted, unleſs where large quantities of fruit are deſired, ſo it will be the ſame thing to allow twice or three times the quantity of ground; ſince there may be a crop of grain of any ſort upon the ſame place, as was before ſaid, ſo that there is no loſs of ground: and, for a family only, it is hardly worth while to plant an orchard; ſince a kitchen-garden well planted with eſpaliers will afford more fruit than can be eaten while good, eſpecially if the kitchen-garden be proportioned to the largeneſs of the family: and if cyder be required, there may be a large avenue of apple-trees extended croſs a neighbouring field, which will render it pleaſant, and produce a great quantity of fruit; or there may be ſome ſingle rows of trees planted to ſurround the fields, &c. which will fully anſwer the ſame purpoſe, and be leſs liable to the fire-blaſts before-mentioned.

BRITISH MUSEUM 1765 OCT

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GARDENERS KALENDAR.

JANUARY.

The Works of this Month in the KITCHEN-GARDEN.

JANUARY being generally ſeverely cold, there is leſs work to be done in the garden than in ſome of the ſucceeding months, when the weather is more kind and indulgent to all ſorts of vegetables.

The gardener is not, however, wholly idle during this inhoſpitable month, eſpecially with regard to raiſing early cucumbers and melons, for which preparations, if not made before, muſt be deferred no longer.

Cucumbers and Melons.

Let about a load of freſh horſe-dung, not too full of ſtraw, be provided. Add a ſmall quantity of ſea-coal aſhes to it, mix the whole well together, and throw it into a heap; after laying a few days to ferment, turn it over a ſecond time, laying it up again in a heap: if there be a conſiderable quantity of ſtraw in it, there will be a neceſſity for turning it over a third time after having lain a few days; this will rot the ſtraw, and mix it thoroughly with the dung, ſo that there will be the leſs danger of burning when the bed is made.

When the dung is thus prepared, mark out the foundation of your bed, in proportion to your light frame, which may very eaſily be done, by ſetting it on the place where you intend to make your bed; then mark the place where the corners touched the ground, remove the frame, and drive down a ſtake in each of the four marks, making an allowance for the bed to be two inches wider each way than the frame.

You ſhould remember that the place where the hot-bed is made, muſt be well ſheltered with reed hedges, and the ground very dry. A trench ſhould alſo be made in the ground of a proper length and breadth, and about a foot deep, into which let the dung be wheeled, and carefully ſtirred up and mixed; ſo that no part of it be left unſeparated; for where there is not this care taken, the bed will ſettle unequally. Care ſhould alſo be taken to beat the dung down cloſe with the back of your fork, in every part of the bed. Some tread the bed; but it will work much more kindly, if ſuffered to ſettle gradually of itſelf.

When the bed is finiſhed, the frame and glaſſes ſhould be put upon it to keep out the rain; but no earth ſhould be laid on the dung till two or three days after, that the ſteam of the dung may have time to evaporate. Let the glaſſes be kept cloſe till the heat riſes to the top, and then raiſe them properly, that the ſteam of the dung may paſs away. If there ſhould be any danger of the bed's burning, it will be proper to lay ſome old dung, or, what is ſtill better, cows dung, over the top of the hot dung, which will effectually keep down the heat, and prevent the earth from being burnt.

When the bed has been made four days, take off the frame and glaſs, and make it perfectly level and the ſurface ſmooth. Then put on the frame, and throw upon the dung as much dry earth as will cover it about two inches and a half thick. At the ſame time fill four or five ſmall pots with rich dry earth, place them on the bed, put on the glaſſes, and keep the whole cloſe till the earth in the pots is warm. As ſoon as this is effected, ſow a few cucumbers or melon ſeeds in each pot, covering the ſeeds about half an inch thick with the ſame earth as that in the pots. The ſeeds ſhould be at leaſt three or four years old. Place the pots in the middle of the bed, and draw ſome of the earth of the bed round each pot. Cover the glaſſes every night with a ſingle mat only for the three or four firſt nights after the ſeed is ſown; but the covering muſt be augmented, as the heat decreaſes.

As the bed is yet very warm, it will be neceſſary to examine it every day, that the pots have not too much heat, which you may eaſily prevent by raiſing the pots farther from the dung. And this is indeed the true reaſon why the ſeeds are ſown in pots, becauſe they can be conveniently raiſed, without giving the leaſt diſturbance to either the ſeeds or plants, and the injury ariſing from too much heat, eaſily prevented.

If proper care be taken, the plants will appear in three or four days after the ſeeds are ſown, when it will be proper to give them air, by raiſing the glaſſes a little every day; and if the earth in the pots appear dry, refreſh it moderately with a little water that has ſtood all night in the bed; but great caution muſt here be uſed; for though the cold muſt be taken off, yet if it be too warm it will deſtroy the plants. They muſt alſo be guarded from the moiſture that frequently drops from the glaſſes, for it will greatly injure them.

If you find that the heat of the bed is ſtrong, let the glaſs be raiſed a little with a prop, when you cover it in the evening; and if a mat be nailed to the frame, ſo as to hang down over the end of the glaſs that is raiſed, the plants will be ſufficiently guarded from the cold, and at the ſame time enjoy the advantage of the freſh air. But when the heat becomes more moderate, the glaſs

may

may be ſhut cloſe every night, obſerving to give the plants air in the day-time, and to hang a mat before the place, as already directed.

As theſe plants are very liable to ſuffer from various cauſes at this ſeaſon of the year, it will be very prudent to ſow a little more of the ſame ſeed in the ſame bed, and in the ſame manner as above directed. Nor would it be wrong to ſow a little ſeed at three different times in the ſame bed, that if one ſowing ſhould miſcarry, another may ſucceed.

When the plants have been up three or four days, they ſhould be planted into ſmall pots, and placed in the ſame bed; but you muſt remember to fill the pots the day before you intend to remove the plants, with rich dry earth, and ſet them within the frame till the next day, that the earth in the pots may acquire a proper degree of warmth. This being done, let about an inch deep of the earth be taken out of the pot; forming a ſmall hollow, like that which might be made by preſſing on it the head of a ſmall watering-pot, in the earth remaining in the pot, and lay the plants on the ſide of it, with their roots towards the center, and cover their ſhanks near an inch thick, with ſome of the earth that was taken out of the pots. Three or four cucumber plants may be thus placed in each pot; but two melon plants will be ſufficient for each pot.

When all the plants are thus ſet, let the pots be plunged into the earth in the bed, cloſe to one another, and all the ſpaces between them carefully filled up with earth. At the ſame time let the whole ſurface of the bed within the frame be covered with ſo much dry earth as will prevent the riſing of the ſteam from the dung, which would deſtroy the plants. There ſhould always be a magazine of good earth laid under cover to keep it dry, in order to earth theſe beds; for if it be taken up wet it will not only chill the bed, but alſo occaſion great damps in it: it is therefore neceſſary to have a ſufficient quantity of earth prepared long before it is uſed.

As ſoon as the plants are fairly rooted, which will be in two or three days after planting, let them be refreſhed with a little water in the warmeſt time of the day; if the ſun ſhines, it will be the better for the plants; but the water muſt have ſtood a ſufficient time within the frame before it is uſed: and as theſe waterings ſhould be repeated moderately, as often as the earth in the pots grows dry, it will be prudent to keep a quart bottle or two full of water within the frame, that it may be always of a proper warmth to be given to the plants whenever they require it.

As it is neceſſary to preſerve the heat of the bed, you ſhould lay ſome ſtraw, hay, or fern, round it, and as high as the earth within the frame. By this means neither rain nor ſnow will chill the bed, which would cauſe a ſudden decay of the heat, and conſequently, greatly check the growth of the plants.

When you find the heat of the bed begins to decline, remove the ſtraw, hay, or fern, from the front and back of the bed, and apply a lining of freſh horſe-dung to both, raiſing it a little higher than the dung of the bed, and covering the top two inches thick with earth. This covering is abſolutely neceſſary to prevent the rank ſteam of the dung from entering the frame among the plants, where it would prove deſtructive.

This lining will ſoon revive the heat of the bed, and continue it near a fortnight longer. But you ſhould not wait till that heat ſubſides: about ten days after the firſt lining is finiſhed, take the ſtraw, hay, or fern, from the other two ſides of the bed, and lay there a lining of freſh dung, as before directed: this will again revive the heat; and the dry litter that was laid round the bed, may be now laid round the lining, which will at once protect it from the cold, and prevent, in a great meaſure, the heat from evaporating. By theſe precautions the heat of the bed may be preſerved for near a fortnight longer.

By proceeding in this manner with making new linings, the plants may be kept in a free growing ſtate in the ſame bed wherein the ſeed was ſown, till they are fit to be tranſplanted into the bed where they are to produce their fruit.

You ſhould obſerve to procure the hotteſt dung for linings, and to ſhake it up in a heap eight days before you uſe it; if in that time it be turned once over, it will be the fitter for the intended purpoſe.

Aſparagus.

In order to raiſe aſparagus on hot-beds, a piece of ground that has been made rich with dung, and well dug and mellowed, muſt be made choice of. Upon this ground ſtrike out lines ſeven or eight inches aſunder, and plant the aſparagus roots in them at four inches diſtance, when they are a year old: in this nurſery they are to remain two years, and be kept clean from weeds, before they are fit for the intended purpoſe. The hot-bed muſt be made pretty ſtrong, and covered immediately with earth ſix inches deep, encompaſſed about with bands of ſtraw. In this bed plant your aſparagus roots from the nurſery, as cloſe as they can be placed together without trimming them. This being done, cover the buds of the plants two inches thick with earth, and let them remain five or ſix days, without putting the frames and glaſſes over them; then lay three inches thick of earth over the whole, and put on the frames and glaſſes. In about ten days after planting the buds will appear: and then give them what air the ſeaſon will permit; for the more air they have, the greener, and better taſted they will be. The bed will laſt about a month, producing freſh buds daily, if the weather be not too ſevere. When the heat of the bed begins to decline, warm horſe-litter laid upon the glaſſes every night will contribute as much to facilitate the ſhoot of the buds, as if new dung were applied to the roots.

Radiſhes.

Radiſhes are ſown on a hot-bed having a ſufficient thickneſs of good rich light mould, that they may have depth to root in before they reach the dung. And to have large and clean radiſhes, make holes as deep as your finger, about three inches diſtance; drop into each hole a ſound ſeed or two, and cover the ſeeds a little, leaving the reſt of the hole open; by which means they will grow to the height of the hole before they dilate their leaves, and leave a long and tranſparent root.

There are ſeveral varieties of radiſhes; as the ſmall-topped, the deep-red, the pale-red, or ſalmon, and the long-topped ſtriped radiſh. The ſmall-topped is moſt commonly preferred by the gardeners near London, becauſe

cauſe they require much leſs room than thoſe which have large tops.

If the weather be open at the beginning of this month, you ſhould ſow ſome ſmall-topped and ſalmon-radiſhes on a warm border, fully expoſed to the ſun, and defended from the north winds by a wall or other cloſe fence.

You muſt however be very careful not to mix the ſeeds: each ſort ſhould be ſown by itſelf; for the ſmall-topped will be fit to draw a full week at leaſt before the other, though both are ſown at the ſame time, and on the ſame bed. There is alſo another reaſon, viz. the latter runs more to leaves than the former. They ſhould therefore have more room to ſpread, for otherwiſe their roots will be very ſmall.

Both ſorts ſhould be ſown pretty thick at this ſeaſon; becauſe the birds will pick up all they can find, and, if not prevented, deſtroy the whole. The weather alſo will deſtroy ſome; ſo that unleſs great care be taken, and a conſiderable quantity of ſeed ſown at firſt, very few plants will come to perfection. Means ſhould therefore be uſed to keep off the birds; and if the weather ſhould prove froſty after the plants are up, a little ſtraw or dry fern, ſhook lightly over the bed, would be of great ſervice to the tender plants; nor will they be bruiſed by this covering, provided care be taken in laying it on, and taking it off the bed.

You will do well to ſow a little of the ſame ſeed at leaſt twice in the month, in the beginning and towards the latter end; by which means you will have a continual ſupply of radiſhes, till the natural crop comes in.

Some ſow their ſeed on a warm ſpot in the common ground, covering it with a frame and glaſſes; by which means they procure a crop at a very acceptable ſeaſon, and have often the pleaſure of ſeeing this bed produce a better return than that ſown on a hot-bed.

Lettuce.

You may alſo raiſe lettuce-plants under a frame with glaſſes, at this ſeaſon of the year; but you muſt be careful to let them enjoy the benefit of the open air as often as poſſible; not by lifting up one of the ends of the glaſſes, but by taking them entirely off the frame, when the weather is dry and mild; but when it is wet, the glaſſes muſt be kept upon the frames, though raiſed to a very conſiderable height, that the air may have free admiſſion to the plants. When the weather is ſevere, they muſt be kept cloſe night and day; and the glaſſes covered every night, and even in the day-time if no ſun appears, and the wind be very ſharp, with mats, or ſtraw.

You muſt be careful to pick off all the dead leaves as they appear upon the plants; and ſtir the ſurface of the ground between them often, taking away all the weeds, or other litter, which would otherwiſe greatly injure their growth.

You may ſow ſome Coſs, cabbage, or brown Dutch lettuce, about the middle of this month, on a warm border, under a wall or pales; obſerving, when you dig the border, to lay it a little ſloping to the ſun. If the weather ſhould prove ſevere ſoon after the ſeed is ſown, it will be adviſable to ſow a little more about the latter end of the month, in order to ſecure a forward crop of lettuce, leſt the ſeed ſown firſt ſhould be deſtroyed.

Small Salleting.

As the weather is generally too ſevere this month for ſowing creſſes, muſtard, rape, &c. in the open air, a ſlight hot bed ſhould be made, on which the ſeeds are to be ſown. Eighteen or twenty inches deep of dung will be ſufficient for the purpoſe; and if you are in want of frames and glaſſes, hoops fixed acroſs and covered with mats will anſwer the intention. The bed muſt be covered five or ſix inches thick with light dry mould. In this mould let ſhallow drills be drawn from the back to the front of the bed, and the ſeed of each ſort ſown pretty thick in theſe drills, covering it about a quarter of an inch deep with mould. But be ſure to give the plants air as ſoon as they appear, by raiſing the glaſſes or mats; for otherwiſe they will mould and ſpoil, as faſt as they come up; ſo very neceſſary is the freſh air to the growth of theſe tender plants.

You may make a bed to raiſe a ſallet in a few hours by the help of powdered lime and hot dung. A layer of the lime muſt be laid firſt, then one of dung, and over that another of lime: the laſt muſt be covered with fine rich mould, and the ſeed ſown upon it, in the uſual manner, covering it very ſlightly.

But if you cannot conveniently make a hot-bed of any kind, you may, if the weather be favourable, ſow the ſeed on a warm border under or near a ſouth wall; obſerving to lay the border ſloping towards the ſun, raiſing it about a foot higher on the north than on the ſouth ſide. Sow the ſeeds on this bed, and put on the frame and glaſſes. The ſucceſs will be certain, unleſs the weather prove very ſevere, when a hot bed will be abſolutely neceſſary to ſupply the warmth requiſite to the vegetation of theſe plants.

Cauliflowers.

Pick off all the leaves that are either withered or damaged from your cauliflower plants, and ſuffer no weeds to grow among them. It will alſo be of great uſe if you can conveniently ſtir the ſurface of the ground about the plants. But however that be, let them have plenty of air every day, by either raiſing the glaſſes, or taking them entirely off the frame, when the weather is mild and dry; but do not open them at all in froſty weather.

You ſhould alſo in ſevere weather remember to cover the glaſſes every night, and ſometimes even in the day-time, with mats, ſtraw, or fern. A little litter laid on the outſide of the frame will likewiſe be of uſe, eſpecially if the joints of it be not very cloſe, as this method will prevent the froſt from affecting the plants.

If your plants are covered with hand or bell-glaſſes, they muſt have air given them every day by raiſing the glaſſes on the ſide next the ſun; but in ſharp weather the glaſſes, muſt be kept cloſe; and in ſevere weather long litter ſhould be laid round each glaſs, which will greatly protect the plants from the injuries of the ſeaſon. Every mild dry day the glaſſes may be taken off the plants for four or five hours; but they muſt be kept cloſe every night; a little earth ſhould alſo be drawn up round the ſtem of the plants.

Cabbages.

Let a convenient ſpot of ground be prepared, when the weather is open, for cabbage plants. The manner of preparing it is this; Lay a ſufficient quantity of rotten dung upon the ground, and dig it a ſpade deep, burying the dung at the bottom of the trench. Into this ſpot the plants may be removed about the latter end of this month, planting them about a foot and a half aſunder. Any of the larger ſorts of cabbages may be planted at this ſeaſon; but the ſugar-loaf and early Yorkſhire cabbage are the moſt proper.

In the other beds, where any of the plants have been deſtroyed either by vermin or the ſeverity of the weather, let their places be new ſupplied with others.

If you ſhould have neglected to tranſplant cabbages for ſeed in the months of November and December, that work may ſtill be done, provided the weather be dry and open. The manner of doing it is this:

Make choice of ſome of your beſt cabbages, pull them up, and carry them to ſome ſhed, or covered place, and there hang them up by their ſtalks, for four or five days, that all the water may drain away from between their leaves; then plant them in ſome border under a hedge or pale, quite down to the middle of the cabbage, leaving only the upper part of it above the ground, obſerving to raiſe the earth about it, ſo that it may ſtand a little above the level of the ground; eſpecially if the ſoil be wet, for then it will be neceſſary to raiſe them conſiderably above the ſurface.

If the weather ſhould prove very ſevere, you muſt lay a little ſtraw, peaſe-haulm, or fern, lightly over them, to ſecure them from the froſt, taking it off whenever the weather proves mild, leſt by keeping them too cloſe they ſhould rot. Theſe cabbages will, by this management, ſhoot out ſtrongly in the ſpring, and divide into a number of ſmall branches.

Mint.

A ſmall hot-bed ſhould be made this month for mint, that will be fit for uſe early in the ſpring. About nine inches deep of dung will be ſufficient for the purpoſe. This ſhould be covered with earth five or ſix inches thick, upon which the roots of mint are to be placed, and covered with earth about an inch and a half deep. Let the bed be covered with a frame and glaſſes, or in want thereof with mats ſupported by hoops fixed acroſs the bed.

Parſley.

If the weather be open, ſome parſley ſeed may be ſown about the middle or latter end of the month, in a warm part of the garden. The drills ſhould be ſhallow, the ſeed ſown in them tolerably thick, and covered with earth about an inch and a quarter deep.

Moſt gardeners ſow parſley in a ſingle drill along the edges of the borders near the paths, where it will flouriſh without taking up too much room.

Beans.

A great variety of garden-beans are now cultivated in the kitchen-gardens of England, differing both in ſize and ſhape; ſome of them producing their pods much earlier in the year than others, for which they are greatly eſteemed.

The Mazagan bean is the firſt and beſt ſort of early beans at preſent known; theſe are brought from a Portugueſe ſettlement, of the ſame name, on the coaſt of Africa, juſt without the Straits of Gibraltar; the ſeeds of this ſort are much ſmaller than thoſe of the horſe bean; and as the Portugueſe are but ſlovenly gardeners, there are commonly a great number of bad ſeeds among them.

The next ſort is the early Portugal bean, which appears to be the Mazagan ſort ſaved in Portugal; for it is extremely like thoſe ſaved the firſt year in England. This is the ſort generally uſed by gardeners for their firſt crop; but theſe are not near ſo well taſted as the Mazagan: when therefore the latter can be procured, no perſon of ſkill would plant the former.

The ſmall Spaniſh bean comes next; this will ripen ſoon after the Portugal ſort; and being a ſweeter bean, ſhould be preferred to it.

Soon after the Spaniſh comes the Sandwich bean; this is almoſt as large as the Windſor bean, but being hardier is commonly ſown a month ſooner; it is alſo a very plentiful bearer.

The Toker bean, as it is generally called, comes about the ſame time with the Sandwich, and being a great bearer, is often planted.

Both the white and the black bloſſom beans are alſo by ſome perſons much eſteemed: the beans of the former are, when boiled, almoſt as green as peas; and this property added to their being very ſweet, renders them valuable; but both theſe ſorts are very apt to degenerate, if their ſeeds are not ſaved with great care.

The Windſor bean is allowed to be the beſt of all the ſorts for the table; when theſe are planted on a good ſoil, and allowed ſufficient room, their pods will be very large, and in great plenty. They are alſo, when gathered young, the ſweeteſt and beſt taſted of all the ſorts: but great care ſhould be uſed in ſaving the ſeed, by pulling up ſuch of the plants as are not perfectly right, and afterwards by ſeparating all the good beans from the bad, when they are taken out of the pods.

If the weather be mild at the beginning of this month, let a proper ſpot of ground be prepared for a principal crop of Sandwich beans. They may, if the weather permits, be planted the firſt week in this month. The rows ſhould be ſix feet diſtance from one another, and the beans ſet five or ſix inches aſunder in the rows.

A few Windſor beans may alſo be planted about the ſame time; but it will be more adviſable to defer the main crop till near the latter end of the month, for they are leſs hardy than the Sandwich bean. The rows ſhould be a yard aſunder, and the beans planted full ſix inches apart. The diſtance between the beans and the rows, is, by ſome gardeners, thought too great; but Mr. Miller aſſures us, he has found for many years experience, that the ſame ſpace of ground will produce a greater quantity of beans, when planted at the above diſtance, than if double the quantity of ſeeds were ſet in it.

The ſame ingenious gentleman alſo obſerves, that a very bad cuſtom too often prevails in gentlemen's kitchen-gardens, namely, that of planting beans for an early

early crop close to the garden-walls, on the best aspects, immediately before the fruit-trees; which is certainly of greater prejudice to the trees, than the value of the beans, or, indeed, of any other early crop: this practice therefore should be every-where discouraged; for it is much better to run some reed hedges across the quarters of the kitchen-garden, where early beans and peas may be planted, where they may more conveniently be covered from the frost, and to which they may be more easily fastened as they advance in their growth, than to walls, covered with good fruit-trees, which must be greatly prejudiced by such practice.

Peas.

There are a great variety of garden-peas now cultivated in England, and which have different titles given them by the gardeners and seedsmen; but as great part of these have been seminal variations, so if they are not very carefully managed, by taking away all those plants which have a tendency to alter, before the seeds are formed, they will again degenerate into their original state. Those persons therefore who are desirous of preserving any variety of peas, should look carefully over those plants they design for seed, at the time they begin to flower, and draw up all the plants they dislike. This is what the gardeners call rogueing their peas, signifying thereby, the separating all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which they always do it before the flowers open: by this judicious practice, and by preserving those for seed which flower soonest, they have, of late years, greatly improved their peas, and are constantly endeavouring to procure still forwarder varieties; so that it would be of very little use, should one attempt to give an account of all the varieties now cultivated; it will therefore be sufficient to mention only the titles by which they are generally known, placing them according to the time of their being fit for the table.

The golden hotspur.	Nonpareil.
The Charlton.	Sugar-dwarf.
The Reading hotspur.	Sickle pea.
Masters's hotspur.	Marrowfat.
Essex hot-spur.	Rose, or crown pea.
The dwarf-pea.	Rouncival pea.
The sugar-pea.	Gray pea.
Spanish Morotto.	Pig pea.

Some golden hotspurs may be sown the beginning of this month, for a full crop, on a warm piece of ground: let them be sown in rows a yard distance. This crop will succeed that sown in December.

You may also sow at the same time, the first crop of marrow-fat peas; and they will suceeed the hotspurs; for they will begin bearing as the others give over. This pea is greatly admired in most families; but the dwarf marrowfat is the most proper to be sown at this season.

If you intend to set sticks in the ground for these peas to run up, the rows must be at least four feet from one another; but if no sticks are intended, three feet and a half will be fully sufficient.

Those beans and peas, if any, already up, should, when the ground is dry, and the weather mild, have some earth drawn up to their stems; for this will at once strengthen the plants, and be of great service in protecting them from the frost.

Celery.

Earth up the celery that requires it, on a dry day, when the weather is open. Take care that the earth be well broken, and laid lightly to the plants, that they may neither be crushed down, nor their hearts buried.

Let the earth be raised very near the top of the plants; for should severe frost set in, all the plants of the celery above the ground will be destroyed; and if any considerable part of the plants should be destroyed, it would even occasion a decay in those parts which are under the surface.

In some families these plants are required every day; some of the rows should therefore be covered with light dry litter, on the approach of hard weather, otherwise it will be impossible to take them up. This method will at once prevent the ground from being frozen, and protect the plants from the piercing coldness of the weather.

Endive.

At this season some of the endive planted about September or October should, when the weather is mild and dry, be taken up, and laid in a ridge of dry earth to blanch. But be sure to hang the best and largest plants a day or two in a dry place, before they are laid in the earth, that the moisture lodged between their leaves may drain off, otherwise the heart of the plants will be rotten before the blanching is completed.

Let the ridge intended for the reception of these plants be prepared in the driest part of the garden, and where the ground is light and fine. The trench should be about two feet and a half wide, and sideways to the mid-day sun. Let it be a good spade deep, and the earth be laid on the north side of the trench, close to the edge, forming a high ridge. Make the sunny side, or that next the trench, as upright as possible, in order to drain off the heavy rains; for if water lies about the plants, it will destroy them.

When your ridge is thus prepared, gather the leaves of each plant regularly and close in your hand, make an opening on the sunny side of the ridge, and put the plant sideways into the earth, almost to the tops of the leaves. The plants may be laid pretty near to each other, so that a short trench will be sufficient for a considerable number.

But there is still a surer method of blanching endive at this season; namely, by laying some dry earth, or old tan, in a frame, sloping to the sun; and burying your endive plants therein almost to the tops of the leaves. When the weather is either wet or frosty, the glasses and other covering, if you think it necessary, may be put on: and by this method there will be no danger of obtaining excellent endive in the severest season; provided care be taken to lay down a quantity at the beginning of a hard frost. A single frame will hold a very considerable number of plants, as they may be laid almost close to each other.

Carrots.

At any time of the month, when the weather will permit, a warm spot of ground should be prepared for a few

few early carrots. Let the earth be dug a full ſpade deep, and the mould broken very fine as you proceed. A ſmall ſpot will be ſufficient for the purpoſe, as it is only intended to raiſe a few that may be fit for the table before the general crop. Let the ſeed be ſown when the weather is mild, and raked in as ſoon as ſown.

If you make uſe of a hot-bed for raiſing carrots early, the earth ſhould be at leaſt ſix inches thick. If you have no frame at liberty, let the bed be arched over with hoops, and covered occaſionally with mats.

Spinage.

If you are deſirous of having ſpinage early in the ſpring, a little ſeed may be ſown in a warm ſpot, about the beginning of the month, and a little more towards the latter end, in order to obtain a regular ſucceſſion. The ſmooth-ſeeded, or round leaved ſpinage is the beſt to ſow at this ſeaſon.

Muſhrooms.

Your muſhroom beds will require conſiderable attendance this month. The plants muſt have a covering ſufficient to defend them from the froſt, rain, or ſnow; and if, by accident, the rain ſhould have penetrated quite through the covering, it muſt be renewed immediately, or your ſpawn will be in danger of periſhing. Let it therefore be replaced with a good covering of wheat or other ſtraw; and if the wet weather be likely to continue, it will not be amiſs to lay ſome mats, or other covering over the ſtraw; for this will greatly tend to preſerve the beds from injury.

The FRUIT-GARDEN and ORCHARD.

Vines.

In pruning vines, which may be done any time this month, obſerve to take away the leſſer and weaker ſhoots, which bear any fruit, and to leave a ſufficient number of the other branches to furniſh every part of the wall, without confuſion.

The ſhoots ſhould be ſhortened to four or five eyes in length; let the branches be cut off about half an inch above an eye, and in a direct ſloping from it; and the branches nailed as ſoon as they are pruned, at about 12 or 13 inches from one another.

You ſhould obſerve to leave every year ſome ſhoots near the bottom of the wall, that you may have a conſtant ſucceſſion of young wood coming up in regular order, in order to ſupply the place of ſome of the old and moſt unſerviceable part of the wood, which ſhould be cut away, when it has advanced near the top of the wall, as it will be then in a manner uſeleſs. This uſeleſs part ſhould be cut away near the bottom, or ſome convenient young branch growing from it, leaving the latter to ſupply the place of the former.

All ſorts of vines are propagated either from layers, or cuttings, the former of which is generally practiſed in England; but the latter, recommended by Mr. Miller, is much preferable to the other. He very juſtly obſerves, that the roots of vines do not, like moſt other ſorts of trees, grow ſtrong and woody, but long, ſlender and pliable; and for this reaſon, when they are once taken out of the ground, they ſeldom ſtrike out any fibres from the weak roots, which generally ſhrivel and dry; ſo that they rather retard than help the plants in their growth, by preventing the new fibres from puſhing out: it will be therefore better to ſet a good cutting, provided it be well choſen, than a rooted plant, as there is very little danger of its growing.

But as there are few perſons who make uſe of proper cuttings, or at leaſt that rightly form their cuttings in England, a few directions for that purpoſe will be neceſſary. You ſhould always make choice of ſuch ſhoots as are ſtrong and well ripened, of the laſt year's growth; theſe ſhould be cut from the old vine, juſt above the place where they were produced, taking a knot, or piece, of the two years wood, to each, which ſhould be pruned ſmooth; you ſhould then cut off the upper part of the ſhoots, ſo as to leave the cutting about ſixteen inches long. When the piece, or knot, of old wood is cut at both ends, near the young ſhoot, the cutting will reſemble a little mallet; whence Columella calls it Malleolus. In making the cuttings after this manner, there can be only one taken from each ſhoot; whereas moſt perſons cut them into lengths of about a foot, and plant them all; but this is very wrong: for the upper part of the ſhoots are never ſo well ripened as the lower, which was produced early in the ſpring, and had the whole ſummer to harden; ſo that if they take root, they never make ſo good plants; for the wood of thoſe cuttings being ſpungy and ſoft, admits the moiſture too freely, whereby the plant will be luxuriant in growth, but never ſo fruitful as that whoſe wood is cloſer and more compact.

When the cuttings are thus prepared, they ſhould be planted immediately, or placed with their lower parts in the ground of a dry ſoil, laying ſome litter on their upper parts to prevent them from drying: in this ſituation they may remain till the beginning of April, when they ſhould be taken out of the ground, and waſhed from the filth they have contracted; and if you find them very dry, let them ſtand with their lower parts in water ſix or eight hours, which will diſpoſe them for taking root. The ground being properly prepared, open the holes at about ſix feet diſtance from each other, and put one good ſtrong cutting in each hole, laying them a little ſloping, that their tops may incline to the wall; but they muſt be put in ſo deep that the uppermoſt eye may be juſt level with the ſurface of the ground; for when any part of the cutting is left above ground, as is the common method uſed by the Engliſh gardeners, moſt of the buds attempt to ſhoot; ſo that the ſtrength of the cutting is divided to nouriſh ſo many ſhoots, which muſt conſequently be weaker than if only one of them grew; whereas, on the contrary, by burying the whole cutting in the ground, the ſap is all employed on one ſingle ſhoot, which muſt, conſequently, be much ſtronger: beſides, the ſun and air are apt to dry that part of the cutting which remains above ground, and by that means often prevents its buds from ſhooting.

Apples, Pears, &c.

If any of your wall or eſpalier trees ſtill remain unpruned, let the work be forwarded now as much as poſſible.

poſſible. When old pear-trees are vigorous, and the ſpace of the wall aſſigned for each is not ſufficient to contain their branches, when properly extended, take away every ſecond or third tree, according as room is wanted, before you prune them. And if the old branches are placed horizontally, lay the new ones left in the middle of the tree in that poſition between them; but if the old horizontals are too near one another, and the tree not vigorous, part of them may be cut away to make room for the new ones; together with ſuch branches as would ſhade the young horizontals. There ſhould be nothing left in theſe places but what will bloſſom that year; nor ſhould there be too many buds left for that purpoſe.

If the tree be weak, it ſhould be conſiderably thinned, by taking out part of the bearers. You may eaſily know what buds will produce bloſſoms by their ſhapes; they are more globular than others; and theſe only ſhould be left on thoſe parts of the old horizontals which are neareſt the ſtem, where the young horizontals are interlaid; but let all the collaterals that are not too long for bearers, and near the extremities of the tree, remain.

Every branch, &c. taken from a tree, muſt be cut off cloſe to the part from whence it proceeded; for when ſtumps are left, they are apt to produce a number of uſeleſs branches.

The hardier ſort of apples require much the ſame management in pruning. Some kinds of apples, eſpecially the nonpareil, will ſometimes bear a ſmall number of fruit upon young wood, or ſhoots of the laſt year's production; but they generally bear moſt upon ſtuds, or ſpurs, proceeding from branches of two, three, or four years old.

When any of the horizontals are cankered, take off the rind as far as the quick, and let all the moſs be clean ſcraped off, both from them and the ſtem; which may beſt be done in wet weather; but if the weather be dry, moiſten the trees well with brine, and when the moſs is taken off, waſh them again with the ſame liquor, which will prevent moſs from growing upon them for the future; by this means the eggs of caterpillars concealed in the cavities of the old bark, will be, in a great meaſure, deſtroyed.

With regard to the pruning orchard trees, nothing more ſhould be done than to cut out all thoſe branches that croſs each other, which if left would rub and tear off its own bark, together with that of the branches it croſſes: all decayed branches ſhould likewiſe be taken away; and when any branches are broken by the wind, they ſhould be cut off, either down to the diviſion of the branch, or cloſe to the ſtem from whence it was produced. But this work ſhould never be done in froſty weather.

Plums and Cherries.

Though theſe trees are ſomewhat tenderer than the apple and pear-trees, yet if the weather be not ſevere, they may be ſafely pruned and nailed, either againſt walls or eſpaliers.

Cherries of different kinds require different ways of pruning and nailing, becauſe they bear their fruit on wood of different ages; the morello and baremdam bear moſt of their fruit upon the extremities of the laſt year's ſhoots, and ſhould therefore be cut and nailed every year, ſo as to procure a ſucceſſion of them. With regard to the other ſorts of cherries, let it be obſerved, that all ſuch young ſhoots of the laſt year's growth, as are now intended to furniſh the wall or eſpalier with bearing wood, muſt not be ſhortened; but every ſuch ſhoot or branch muſt be left at its full length; and this ſhould at all times be practiſed, which is the only way to render the branches fruitful; for the ſhoots thus treated, will, in two years time, ſend out many ſhoots, or fruit-ſpurs, about half an inch or an inch in length, and from theſe ſpurs the fruit is always produced. Theſe ſpurs generally appear firſt near the extreme part of the branches; ſo that by ſhortening them, that part where the bloſſom-buds would otherwiſe have made their appearance, would conſequently be cut away.

In nailing theſe, or indeed any other kind of ſtone fruit, take care that the rind be neither galled nor bruiſed by either hammer or nail; for this will cauſe gum to iſſue from the wounded part, which will either kill or weaken the part it proceeds from.

Plum trees are obſerved to produce the beſt fruit upon the youngeſt bearers, unleſs too great a number of them be ſuffered to remain; theſe ſhould therefore be carefully preſerved; by which means a large quantity of the beſt fruit will be procured.

We have already obſerved, that the top or young ſhoots left for bearing wood, ſhould not be ſhortened in either apples, pears, or cherries; and ſhall now add, that the ſame ſhould be obſerved with regard to plums. But in ſome inſtances this uſeful rule muſt be diſpenſed with; particularly when the trees are about ſix years old from the budding or grafting, and newly planted againſt walls or eſpaliers. For it is neceſſary that all the ſhoots produced the two firſt years after the budding or grafting, ſhould be ſhortened; which ſhould be done in the ſpring, cutting them to four or five eyes; by which means they will put out lateral branches near the ground, and furniſh regularly the wall or eſpalier with branches from the bottom. After this the branches are to be trained along at their full length, except it ſhould be found neceſſary to ſhorten one or two of the middlemoſt ſhoots, in order that each may throw out two or three lateral branches, to furniſh that part of the tree. Let theſe lateral ſhoots alſo be trained at their full length, unleſs there are ſtill more branches wanting, when one or two of the moſt convenient of the laſt ſhoots may be likewiſe ſhortened, to promote their producing more lateral branches, to cover the wall: for the great art conſiſts in encouraging your fruit trees to produce ſhoots in proper places, ſo as to cover the wall or eſpalier regularly with branches, from the bottom to the top.

But when the trees have acquired branches ſufficient to cover the wall or eſpalier in regular order, you are then to ſhorten no more of the branches, except in caſes where wood is wanting.

Peaches, Apricots, and Nectarines.

If the weather proves mild, peaches, apricots, and nectarines, may be pruned and nailed any time this month. For though they are rather more tender than any of the ſorts above mentioned; yet extreme hard froſt only can affect the parts that are newly cut; and in ſuch ſevere weather no pruning ſhould be attempted.

There is very little difference in the method neceſſary to be obſerved in pruning either of theſe trees; the fruit

of them all being produced from the ſhoots of the laſt year: a proper ſupply therefore of the beſt of the laſt year's ſhoots muſt now be left in a regular manner in every part of the tree; and theſe ſhoots muſt be ſhortened, in order to encourage them to produce a ſucceſſion of bearing wood during the ſucceeding ſummer; for the wood then produced will bear fruit the ſummer after.

It will be proper, before you begin pruning, to unnail the greater part of the tree, that room may not be wanting to uſe your knife properly: and when you have finiſhed the pruning of one tree, let that be nailed up again, before you proceed to another.

But be careful to remember, in the pruning of theſe trees, to ſelect the moſt promiſing and beſt ſituated ſhoots, which are to be preſerved at proper diſtances in every part of the tree, and room made for them by cutting away the decayed ſhoots, and old uſeleſs wood.

Another circumſtance neceſſary to be remembered is, that the ſhoots ſhould always be ſhortened in proportion to their own ſtrength and that of the tree. If the latter be weak, the ſhoots ſhould be left about ſix or ſeven inches from one another, and ſhortened according to their ſtrength: ſome may be left ſix, others eight, ten or twelve inches long; varying the length of the ſhoot in proportion to its ſtrength.

If the tree be neither very vigorous, nor very weak, the ſhoots ſhould be laid in about five or ſix inches aſunder, and ſhortened to about eight, ten, twelve, or fifteen, in proportion to their ſtrength.

But where the tree is very vigorous, the ſhoots ſhould be very little ſhortened; ſome to the length of ten, twelve, or fifteen inches, whilſt the ſtrongeſt may be laid in eighteen inches, or two feet long, and ſome of them even at full length.

Care ſhould be taken, in ſhortening the ſhoots of theſe trees, to cut them off, if poſſible, at an eye likely to produce a leading ſhoot: ſuch eyes are known by their having two bloſſom-buds; between which there will iſſue a wood neceſſary to the welfare of the fruit; for where ſuch a ſhoot is produced at the extremity of a bearing branch, it draws nouriſhment to the fruit, and renders it much finer than the fruit of thoſe ſhoots deſtitute of leaders.

Gooſeberry and Currant-trees.

It is a common practice in pruning gooſeberry-ſhrubs, to make uſe of garden ſheers, obſerving only to cut the head round, as is practiſed for ever-greens, &c. whereby the branches become ſo much crowded, that what fruit is produced, never grows to half the ſize it would do, were the branches thinned and pruned according to art; which ſhould always be done with a pruning-knife, ſhortening the ſtrong ſhoots to about ten inches, and cutting out all thoſe which grow irregular, thinning the fruit-bearing branches where they are too cloſe, obſerving always to cut behind a leaf bud. With this management the fruit will be near twice as large as thoſe produced upon ſuch buſhes as are not thus pruned, and the ſhrubs will continue much longer in vigour.

The currant-tree produces its fruit from the former year's wood, and alſo upon ſmall ſnags which come out of the old wood; ſo that in pruning this ſhrub, the ſnags ſhould be preſerved, and the young ſhoots ſhortened in proportion to their ſtrength. The only care neceſſary in pruning them is not to leave their ſhoots too cloſe, and never to prune their ſnags in order to make them ſmooth. This, with a ſmall degree of attention in obſerving the manner of their growth, will be ſufficient to inſtruct any perſon how to manage this plant, ſo as to produce great quantities of fruit.

You may during this month, provided the weather be mild, plant both gooſeberries and currants; and if the trees are to be ſet round the quarters of the kitchen-garden, prune them up to one ſtem, twelve or fifteen inches before you form the head of the tree; for when theſe trees are ſuffered to branch away immediately from their roots, they injure all the ſmall crops that grow near them, and render it very troubleſome to dig round them.

Raſberries.

The method to be obſerved in pruning theſe plants, is to cut away the dead wood cloſe to the ground, clearing away all the ſmall ſhoots in general, and leaving only three or four of the ſtrongeſt ſhoots of the laſt ſummer's growth to bear fruit next year, upon each root. All the reſt ſhould be cut off cloſe to the ſurface of the ground.

At the ſame time thoſe ſhoots left for bearing, ſhould each of them be ſhortened, about one third, or at leaſt one fourth, of the length of each ſhoot.

The ſpaces between the rows ſhould be well dug to encourage their roots; and if you bury a little rotten dung therein, it will make them ſhoot vigorouſly the following ſummer, and their fruit will be much larger and better.

You may now make plantations of raſberries, leaving at leaſt four feet between the rows, and ſetting the plants a yard diſtant in the rows. Theſe plantations are generally made with ſuckers; but Mr. Miller prefers ſuch plants as are raiſed by layers, becauſe they will be better rooted, and at the ſame time leſs liable than the others to ſend out ſuckers: and where theſe are not carefully taken off or thinned, the fruit will be ſmall and in little quantity, eſpecially when the plants are placed near each other, which is too often the caſe, few perſons being willing to allow theſe plants ſufficient room.

The PLEASURE or FLOWER-GARDEN.

Unleſs the utmoſt care be taken to protect your choiceſt flowers from the inclemency of the ſeaſon, they will ſuffer greatly; attention is therefore neceſſary for them all, though they in general require a different management.

Carnations, Hyacinths, &c.

Let your carnations that are in pots be well ſecured from froſt, heavy rains, and ſnow, which would greatly injure, if not intirely deſtroy them.

The beſt beſt method is to plunge the pots at the beginning of winter into a bed of dry compoſt, arched over with hoops, which, when the weather is very wet or froſty, ſhould be carefully covered with mats. But when the weather is mild, let the covering be removed, that the plants may enjoy the free air, ſo neceſſary to their health.

You

You ſhould alſo in froſty weather cover the beds where you have depoſited the choiceſt kinds of hyacinths, tulips, or any other curious roots. Fern or long litter will do very well for this purpoſe: but you muſt remember to remove it, as ſoon as the ſevere weather is over.

As ſoon as any of the above plants begin to appear above ground, let the bed be arched over with hoops; and when the weather is either very wet or froſty, let them be covered with mats, faſtened down at the ſides to prevent the wind from blowing them off. But be ſure to take away the mats as ſoon as the weather is dry and open.

Auriculas.

As heavy rains, ſnow, or ſharp froſts, will greatly injure theſe delicate plants, they ſhould always be removed about the end of October into frames, or on a bed arched over with hoops, and ſituated in a warm place, where they may be conſtantly covered when the weather is unfavourable: but remember to take off the covering, whenever the weather is mild and dry.

About the latter end of the month, if the weather be mild, take away the upper part of the earth in the pots, as low as you can without diſturbing the roots, and fill up the pots with freſh rich earth, which will greatly ſtrengthen their bloom. The beſt compoſt for this purpoſe is good freſh light ſandy mould, mixed with very rotten neats dung, or any rotten dung from the bottom of an old hot-bed. At the ſame time clear the plants from all dead leaves. As ſoon as this is done, and the pots filled up with freſh mould, let them be returned to the place intended for ſheltering them from the weather.

Anemonies, Ranuncluluſes, &c.

You may now plant thoſe roots of anemonies and ranunculuſes, &c. you reſerved, in order to ſucceed thoſe planted in October and November. But you muſt chuſe a mild day for this work, and take care that the ground be not very wet, which will rot the roots. Let the beds be laid arching, that the rain may run off: they ſhould not be more than four feet wide. In theſe the roots ſhould be planted in rows nine inches diſtant, and about ſix inches between each root. They ſhould be ſet about two inches and a half deep in the earth.

Tulips.

A few tulips may now be planted to ſucceed thoſe ſet in autumn. They ſhould not be deferred any longer, and therefore the firſt mild day ſhould be choſen for this purpoſe; for it they are not planted this month, they will blow but very poorly.

If they are to be planted in beds, let them be made rounding, that the wet may not remain on the ſurface, and about four feet wide. The roots ſhould be planted in rows about nine inches diſtant, and the ſame diſtance ſhould be allowed between the roots, which ſhould be ſet about four or five inches deep in the ſoil. If you plant ſome of the inferior roots in the borders, they may be ſet in a row about a foot from the edge, and the roots about the ſame diſtance from each other.

But if you plant them in little clumps, they will make a more beautiful appearance. For inſtance, if you plant four or five roots in a circle about eleven inches in diameter, with another in the center; and about ten or twelve feet further ſuch another clump, and ſo on to the end of the border; the effect, when the plants are in flower, will be very agreeable.

Crocuſſes.

Theſe ſhould be planted in borders by the ſides of the walks, within ſix inches of the edge of the border; but not in one continued row; for they appear to much greater advantage when planted in clumps, as was before obſerved of tulips. Obſerve alſo, if you have different kinds of crocuſſes, to plant each ſort ſeparate: that is, let one of the clumps be of the yellow ſort, the next of blue, and ſo on to the end of the border.

Jonquils, Narciſſuſes, &c.

If you have any left of theſe, or any other kind of bulbous roots, they ſhould be planted as ſoon as the weather will permit. Mild dry weather muſt be choſen to plant theſe, and indeed all other kind of flower roots. Nor ſhould the ground be too wet, for that will rot the roots.

Theſe, or any other ſpecies of bulbous roots intended to be ſet in the borders, ſhould be planted in clumps or patches, as we before directed for tulips, &c.

Double Sweet-Williams, double Wall-flowers, &c.

All the ſpecies of theſe flowers preſerved in pots, ſhould be carefully ſecured from ſevere froſt. If the plants are placed in frames, or beds arched over with hoops, let the glaſſes or mats be kept over them whenever the froſt is ſharp, and alſo in very wet weather. But the glaſſes or covering muſt be taken away in mild, dry weather; for a free circulation of air is of the utmoſt importance to their health.

Care ſhould alſo be taken to protect all the fibrous-rooted perennial plants in general, that are in pots, from the froſt. The pots ſhould be plunged to the rims in a dry warm border, and covered during the bad weather with long litter: at leaſt the pots ſhould be removed into ſome ſheltered place, at the approach of ſevere froſt.

Seedling-flowers.

Be very careful to lay peas-haulm, or fern, over your boxes of ſeedling-flowers in froſty weather; let the covering be of a conſiderable thickneſs, and preſſed cloſe down at the edges.

If your ſeedling flowers are planted in beds in the garden, they ſhould likewiſe be covered with peas-haulm, fern, or long litter, during the froſt: but be ſure to remove it both from the beds and boxes, as ſoon as the weather is mild and open, that the tender plants may enjoy the benefit of a free circulation of air.

Flowering-ſhrubs.

All the flowering ſhrubs planted in clumps in the ſhrubbery, ſhould now be pruned, and all the ſuckers cleared away from their roots. Never uſe the ſheers, but a knife in pruning your ſhrubs, and be careful to cut

cut away all the dead wood, and thin the branches, where they crowd upon one another. The ſtraggling branches ſhould alſo be taken away, and the ſhrubs kept clear from each other, ſo that every kind may be ſeen diſtinctly.

Thoſe flowering-ſhrubs and ever-greens that are ſet in pots ſhould be protected from the ſharpneſs of the froſt, by plunging the pots up to their rims in the ground in a dry part of the garden.

Litter ſhould alſo be laid round the ſtems of new planted flowering-ſhrubs and ever-greens, if the froſt becomes ſevere; let the litter extend as far at leaſt from the ſtems as the roots of the plants.

Let your new planted trees, &c. be ſupported with ſtakes, that they may not be diſplaced by the wind.

The ground between the flowering-ſhrubs and ever-greens ſhould be dug, obſerving to ſhorten the ſtraggling roots as you proceed, taking care not to diſturb the plants. This will not only be of ſervice to the ſhrubs, but alſo give the ſhrubbery a neat appearance.

You ſhould be very careful at this ſeaſon of the graſs walks in the garden; they ſhould be frequently polled and rolled. The former ſhould be done with a pliable aſh-pole, fifteen or ſixteen feet long, at leaſt; with which you muſt break and ſpread the wormcaſts, whenever they appear upon the graſs. When this is done, let it be rolled with a wooden roller, which will take up all the wormcaſts, and leave your graſs walks extremely neat.

This is alſo a proper ſeaſon, if the weather is open, for laying turf where wanted, for making or mending graſs-walks. Your turfs ſhould be three feet long, one foot broad, and an inch thick.

The beſt turf for gardens is that of heaths or commons, where great numbers of ſheep are paſtured.

As ſoon as the turf is laid, it ſhould be well beaten with a heavy wooden beater, and afterwards rolled with a large ſtone or iron roller.

Such of the gravel walks as are not laid up in ridges ſhould be kept clean from litter, and free from weeds; and if they are rolled as often as the weather will permit, it will be of great ſervice.

The NURSERY.

In open weather, let the ground be dug between the rows of young trees and ſhrubs. It ſhould be dug one ſpade deep, and the earth turned fairly off the ſpade, that the weeds may be perfectly buried.

If the weather be froſty, let dung be laid on ſuch parts of the nurſery as require it. But obſerve that the dung be perfectly rotten, otherwiſe it will be prejudicial to the plants. If a little be laid between the rows of trees, and dug in, it will do them ſervice.

FEBRUARY.

Work to be done in the KITCHEN GARDEN in February.

THIS is a buſy month for the gardener, provided the weather be fine and open; we ſhall therefore be careful to let our directions be full and intelligible.

Aſparagus.

It is not yet too late to make hot-beds for early aſparagus. In order to which let ſome good dung be procured and ſhook up into a heap, where it muſt lie about ten days, when it will be fit for your purpoſe. Let the bed be about three feet high, and the top made very level and ſmooth. When this is done, lay on the earth ſix or ſeven inches thick in every part, and make the ſurface ſmooth.

When your bed is thus prepared, raiſe a ridge of earth about ſix inches high from one end of the bed to the other, and place the roots againſt this ridge, as cloſe together as poſſible, till the whole bed is filled with them; obſerving to leave a ſpace two inches wide, at leaſt, on each ſide, to receive ſome earth againſt the outſide roots.

This being done, cover the crowns of the roots with light earth about two inches thick; which is all that is requiſite to be done till the buds begin to appear through the ſurface, when three or four depths of more earth muſt be laid upon the bed; by which means the tops of the roots will be covered five or ſix inches.

A quantity of ſharp pointed ſtakes, about two feet long, and alſo ſome thick bands or ropes of either ſtraw or hay muſt be procured. Theſe hay or ſtraw-bands are to be carried entirely round the bed, and faſtened down with the ſtakes at proper diſtances. Upon this border the frame is to be placed; which being done, the glaſſes muſt be put on, and covered every night with mats. Be very careful that the hay or ſtraw-bands be directly level with the ſurface of the earth in the bed.

In about thirty or forty days, the bed, if properly managed, will produce plenty of buds. But it is neceſſary to remember, that the roots for this purpoſe be about three years old, never more than four. A three-light frame, if properly placed, will contain three or four hundred roots.

Cucumbers and Melons.

Your cucumbers and melon plants that have not ſuffered by any of the accidents that too often attend them at this ſeaſon, may now be tranſplanted into the hot-bed, where they are to produce their fruit. In order to this, let as much horſe-dung as will be ſufficient for making a hot-bed for one or more frames, three feet and a half high, be provided.

As ſoon as the dung is procured, let it be thrown up into a heap, where it muſt lay eight, ten, or twelve days, according to the condition it is in, or the quantity you intend to uſe. During this interval, let the heap be turned over once at leaſt; by which means the rank ſteam and ſtrong ſtench of the dung will fly off, and the ſeveral parts will become mellow, and mix together, when made into a bed: the heat will alſo be ſteady and laſting.

In

In making the bed, obſerve to ſhake ſome of the longeſt dung into the bottom; after which take it as it comes to hand, ſhake it equally on every part, and beat it down with the fork from time to time as you proceed. In this manner let the bed be carried up very evenly on each ſide, to the height of forty inches.

As ſoon as the bed is finiſhed, put on the frame and lights, which will at once defend it from the rain, and draw up the heat conſiderably ſooner. But it will be neceſſary to raiſe the lights a little, when it does not rain, that the ſteam may paſs off. When the bed has been made about a week, look it carefully over; and if it has ſettled unequally, take off the frame, level the bed, and replace the frame for good.

The bed muſt now be every day be attentively examined: as ſoon as you find the violent heat is over, the earth may be laid upon the ſurface.

It is neceſſary to be remembered, that the earth choſen for this purpoſe be quite dry, and ſufficiently rich. Let about three quarters of a buſhel of this earth be laid in a round hillock about twelve inches high, in the middle of each light; and the ſpaces between the hillocks, quite to the edge of the frame, be covered with the ſame ſort of earth, two or three inches thick.

As ſoon as you have put the earth in the above manner upon the bed, put on the glaſſes; and the next day, if the hillocks of earth be warm, level the top of each a little, ſo that they may be about ten inches high; and then begin to put in the plants.

This being done, take ſome ſome pots of the ſtrongeſt plants, lay your hand on the ſurface of the pot, and take the ſtems of the plants carefully between your fingers: then turn the mouth of the pot downwards, and ſtrike the edge gently againſt the frame; by which means the plants, with the ball of earth to their roots, will come out entire. When this is done, make a hole in the middle of each hillock of earth, and place one pot of plants with the ball entire, in each hole, cloſing the earth well round the ball. Obſerve to cover the top of each ball about an inch, and to lay the earth cloſe round the ſtems of the plants.

About eleven or twelve o'clock the next day, give the plants a little water, obſerving to uſe ſuch as have ſtood long enough in the bed to take off the chillneſs. You ſhould alſo be careful to let very little, if any, of the water touch either the leaves or ſtems of the plants at this ſeaſon.

The only difficulty now remaining is to keep up a conſtant genial heat in the bed, that the plants may be kept in a continual growing ſtate.

But you muſt remember to raiſe the glaſſes a little every day when the weather is any thing favourable, that the plants may enjoy the freſh air; and to open the glaſſes more or leſs, in proportion to the ſharpneſs or mildneſs of the weather.

The firſt week or ten days after the plants are thus ridged out, you muſt be very careful to prevent the plants from having too much heat; for it ſometimes happens that a bed, after the mould and plants are in, will begin afreſh to heat, in ſo violent a manner as to burn the earth at the bottom of the hillocks; and unleſs ſome precaution be taken, the burning will ſoon reach the roots of the plants. It will therefore be neceſſary, during the firſt week at leaſt, to examine frequently the bottoms of the hillocks, by drawing away a little of the earth, and, if any burning appears, to remove the burnt earth, replacing it with new. At the ſame time let part of the earth at the bottoms of the hills be drawn away, leaving them only baſes ſufficient to ſupport the plants. And in this manner let them continue till the danger of burning is over.

When you give the plants air, you ſhould faſten a mat acroſs the ends of the lights, and let it hang down over the place where the air enters the frame; for this will, in a great meaſure, deſtroy the current of wind, ſo that it will not injure the plants, though there will be a proper proportion of air admitted; and at the ſame time the ſteam will have full liberty to evaporate.

Let the glaſſes be every night covered with mats, and if there be a ſtrong heat and conſiderable ſteam in the bed, let the lights be raiſed a little when you cover up, letting them remain ſo all night; by which means the ſteam will fly off through the matting, without the cold air being admitted to the plants.

As ſoon as the roots of the plants begin to appear through the ſides of the hillocks, let ſome earth be laid round them, and, about three days after, a little more. And in two or three days after that, you may earth the bed all over to the full thickneſs, ſo that the whole ſurface may be level, and equal with the tops of the hillocks.

The heat of the bed will in a little time begin to grow faint: as ſoon as this happens, let a lining be applied to either the back or front of the bed, or, if the heat be very low, to both.

Theſe linings ſhould be compoſed of dung prepared in the ſame manner as that for making the bed. They ſhould be about eighteen inches thick, and raiſed about five or ſix inches higher than the dung of the bed. Some earth ſhould be laid upon the top of the linings, to prevent the heat from finding a paſſage that way; for it would otherwiſe, in all probability, inſinuate itſelf into the frame, and prove detrimental to the plants.

If the plants are not already ſtopped at the firſt joint, let it be done now; for this will cauſe them to ſend out fruitful runners.

Cucumber and melon ſeeds ſhould be ſown at two or three different times this month, that a freſh ſupply of plants may be always ready, either for new beds, or for replacing any that may fail.

Cauliflowers.

The glaſſes ſhould be taken off the frames every mild day, that the cauliflower plants may enjoy a free circulation of the freſh air.

Some of the ſtrongeſt plants may, about the end of the month, be removed into the place where they are to continue. Let them be planted in a rich ſpot of ground, and a ſpace of thirty inches, or a yard every way, be allowed between the plants.

Thoſe cauliflower plants alſo which are under hand or bell-glaſſes, ſhoud be thinned out when there are too many; one plant under each glaſs will be ſufficient, the reſt ſhould therefore be taken away. But remember to let the ſtrongeſt plant under each glaſs remain; and, at ſame time, to draw up ſome earth round their ſtems. The plants taken up may be planted at the above diſtance from each other, in another ſpot of ground.

At the beginning of this month ſome cauliflower ſeed ſhould be ſown on a ſlight hot-bed, that plants may not be wanting to ſucceed the early crop. The bed for this purpoſe ſhould be about twenty inches thick of dung; and the earth over it five or ſix inches thick. On the ſurface of this earth let the ſeed be ſown, and covered with light earth about a quarter of an inch thick. After which let the frame be put upon the bed.

As ſoon as the plants appear, they muſt have freſh air given them every day, by raiſing the glaſſes a conſiderable height. In mild weather the lights ſhould be taken entirely away, during the day-time; otherwiſe they would be drawn up very weak.

If moderate ſhowers of rain do not fall, the plants muſt be frequently ſprinkled with water.

Kidney-Beans.

A hot-bed may be made in the beginning of this month for early kidney-beans.

In order to this ſome freſh horſe dung ſhould be prepared as for other hot-beds; theſe ſhould be made about two feet and a half high, and long enough for one or more frames. Put on the frames, after mkaing the ſurface of the bed ſmooth; and when the heat is moderate, cover the bed with rich light earth ſeven or eight inches thick. Then draw drills an inch deep, and a foot aſunder, from the back to the front of the frame. Drop the beans, about three inches aſunder, into the drills, and cover them an inch deep with earth.

The yellow, or liver-coloured, kidney-bean is the fitteſt for this purpoſe; though the ſpeckled, or dwarf kind will anſwer very well; for both theſe will continue bearing longer than the other ſorts. As ſoon as the plants begin to appear, the lights muſt be raiſed every day, that the plants may enjoy the benefit of the freſh air, which will ſtrengthen them greatly. Moderate ſprinklings of water at proper times will alſo be neceſſary when the plants are up.

Cabbages and Savoys.

Sugar-loaf and other early cabbage-plants ſhould be removed this month into the ſpot where they are to remain Some rotten dung ſhould have been dug into the ground where theſe plants are to be ſet. Let the plants be ſet in rows two feet and a half aſunder, and the ſame diſtance between the rows.

A little cabbage ſeed ſhould be ſown about the latter end of the month for autumn uſe. Theſe will ſucceed the early plants, for they will be fit to cut in Auguſt and September.

About the latter end of the month, Savoy-ſeed may be ſown for the firſt time. Thoſe plants which are ſown now will be fit for the table in September; by October they will be finely cabbaged, and continue good till the end of November.

You may likewiſe plant this month, if not done before, both cabbages and ſavoys for ſeed.

Carrots, Parſneps, and Beets.

About the latter end of this month, a ſufficient ſpot of ground ſhould be prepared for carrots, parſneps, and beets.

The farther from trees, and the lighter the ground in which the roots are planted, the larger they will grow; for they thrive beſt in a light ſoil and open expoſure. The ground ſhould be dug one full ſpade deep at leaſt, and the clods carefully broken.

The ſeed ſhould be ſown in a dry, clear day, with an even hand, not too thick, and the ground equally raked afterwards. Each ſpecies of ſeed ſhould be ſown on different pieces.

Thoſe carrots, parſneps, and beets, that are intended for ſeed, ſhould be planted in rows two feet aſunder.

Beans.

At the beginning of this month let an open ſpot be dug for a crop of beans. The Windſor, Sandwich, and other large beans, are the moſt proper to plant at this ſeaſon; but they ſhould be planted in rows ſix inches aſunder, and the rows a full yard apart.

The Mazagan bean alſo may now be planted either in the garden, or the field; it is a good bearer, and will, in ſome ſoils, anſwer very well.

Peas.

About the beginning of this month a principal crop of peas ſhould be ſown in an open piece of ground. If you propoſe to ſow the marrowfats and other large peas, you ſhould draw drills for them, three feet and a half aſunder; but if you intend to place ſticks for the ſupport of theſe large kinds of peas, they ſhould be ſown in drills four feet aſunder.

The hotſpur, and other ſmall kinds of peas, ſhould be ſown in drills a yard aſunder; if you intend to ſtick them, let the drills be forty inches aſunder.

All the crops, whether beans or peas, that are up and advanced any conſiderable height, ſhould now have earth drawn up their ſtems, which will at once ſtrengthen the plants, and protect them from the froſt. It ſhould however be done in a mild day.

Lettuces.

If the weather be mild about the beginning of this month, you may ſow ſeveral ſorts of lettuce-ſeeds on warm borders. The Coſs and Sileſia are the beſt kinds for ſowing at this ſeaſon: you may alſo ſow ſome of the cabbage and imperial lettuces. Let the ſeeds be ſown pretty thick, and raked in as ſoon as they are ſown.

But if the weather ſhould be cold at the beginning of the month, the ſeed of both the Coſs and Sileſia ſhould be ſown in frames, and covered occaſionally to protect it from the ſeverity of the weather. By this means you may procure ſtrong plants in unfavourable ſeaſons, and they may eaſily be tranſplanted when of a proper ſize.

Thoſe plants which have ſtood the winter in warm borders or frames, ſhould be thinned out, where they ſtand too cloſe, about the latter end of the month. But you muſt obſerve to thin them regularly, leaving them a foot diſtant each way; for they will require ſo much room to grow to their full ſize: the plants which are taken up ſhould be ſet in an open ſpot of rich ground, a foot diſtant every way.

Small

Small Salleting.

Let different ſorts of ſmall ſalleting be ſown once a week or ten days, viz. creſſes, muſtard, radiſh, rape and lettuce. The ſeeds ſhould be ſown in a frame, the earth light, and its ſurface laid very ſmooth.

Shallow drills ſhould be drawn from the back to the front of the frame, the ſeeds ſown in the drills, and covered about the fourth part of an inch thick. As ſoon as this is done, put on the glaſſes; but be ſure to give the plants air as ſoon as they are above the ſurface.

If the weather ſhould prove cold and wet, and ſmall ſalleting be much wanted, a ſmall hot-bed may be made for it. About fifteen inches thick of freſh horſe dung will be ſufficient for this purpoſe, and the bed covered with earth four or five inches thick.

Let the ſeed be ſown on the ſurface, each ſort ſeparate, and as much earth ſifted over as will juſt cover it. Put on the frame, with the lights; and when the plants appear, let plenty of freſh air be given them.

If the weather be open and mild, you may, about the middle of the month, begin to ſow ſmall ſalleting on warm borders, in open ground.

Celery.

Prepare a ſmall bed of light rich earth in a warm border, in order for ſowing ſome celery-ſeeds, about the middle, or towards the latter end of the month. Let the earth be broken fine, the ſurface raked ſmooth, and the ſeed ſown not too thick upon it; after which let the ſeed be covered with light earth about a quarter of an inch thick.

Radiſhes.

About the beginning of the month, let ſome part of a warm border be dug up in order to ſow a little radiſh ſeed. The ſmall-topped radiſh ſeed ſhould be ſown at this ſeaſon, to ſucceed thoſe of the ſame ſort that were ſown in the preceding month.

Another piece of ground ſhould be dug at the ſame time for ſowing ſalmon radiſh-ſeed; becauſe theſe will ſucceed the ſmall-tops. Some more of the ſalmon radiſh ſeed ſhould be ſown about a fortnight or three weeks after the former, that there may be a regular ſupply of theſe roots in their proper ſeaſon.

Spinage.

If the weather be mild about the beginning of this month, ſome ſpinage ſeed ſhould be ſown in good ground well prepared to receive it. Let the ſeed be ſown thin, regular, and raked in.

Some ſow ſpinage between the rows of cabbages, beans, &c. when ground is ſcarce. The ſmooth ſeeded kind is the beſt to ſow now; and it will be proper to repeat the ſowings every fortnight or three weeks, if a regular ſupply of this vegetable be deſired.

Potatoes.

About the middle or latter end of this month, provided the weather be open, you may plant potatoes. Let them be ſet in rows two feet aſunder, and a foot or fifteen inches diſtant from one another in the rows. The roots ſhould be planted about five or ſix inches deep in the earth.

We have already given ample directions for planting this uſeful root in the fields. See the article POTATOE in the foregoing dictionary.

Sorzonera, Salſafay, and Hamburg Parſley.

About the latter end of the month, let a ſpot of light ground, in an open ſituation, be dug for the above herbs. The ſeed muſt be ſown thin and even, on ſeparate beds, and raked in equally.

Thyme, Marjoram, Savory, and Hyſſop.

Theſe herbs ſhould be ſown upon a dry ſpot of light, rich ground, in a warm ſituation, about the latter end of the month. They ſhould be ſown thinly on ſeparate beds; and the ſeeds raked in.

Parſley, Coriander, and Chervil.

Any time this month, when the weather is open, will be proper for ſowing parſley, coriander and chervil. The ſeed ſhould be ſown in ſhallow drills, and covered with about a quarter of an inch of mould.

Garlick and Shallots.

The beds intended for planting garlick and ſhallots ſhould be about four feet wide, and the roots ſet in rows nine inches aſunder, and ſix inches diſtant from one another in the rows.

Muſhrooms.

You muſt take particular care to defend your muſhroom beds from heavy rains and froſt, as either will deſtroy the ſpawn. The beds ſhould be entirely covered with ſtraw, twelve or fifteen inches thick at leaſt. And if you ſhould at any time perceive that the wet has penetrated through any part of the covering, let that part be removed, and replaced with clean dry ſtraw.

Horſe-Radiſh.

Horſe-radiſh is propagated either by cuttings, or by planting the tops of the old roots, in the following manner:

Let the trenches in which the cuttings, &c. are to be planted, be dug fifteen inches deep at leaſt. When the trench is ready procure ſome knotty roots, and cut them into pieces, about an inch or two in length, obſerving that each piece be furniſhed with eyes or buds; but it will ſtill be better if you can procure a quantity ſufficient for your purpoſe, of the tops or crowns. Theſe may be cut from the tops of ſmall off-ſets, which grow from the main roots, and alſo from the old roots when they are taken up for uſe.

When you have furniſhed yourſelf with a ſufficient quantity of cuttings or crowns, place them along the bottom of the trench ſix inches from each other. Then let the next trench be dug in the ſame manner as the firſt, throwing the earth taken out of the latter into the

former trench, over the plants. In this manner you are to proceed with the reſt of the trenches till the whole quantity intended is planted.

The FRUIT-GARDEN.

Pruning Fruit-trees.

As this is the peculiar month for pruning fruit-trees, we ſhall conſider this work in general, before we proceed to particular trees.

No part of gardening is perhaps of more general uſe than that of pruning, and yet it is very rare to ſee fruit-trees ſkilfully managed. Almoſt every gardener pretends to be a maſter of this buſineſs, though very few rightly underſtand it. Indeed it requires a ſtrict obſervation of the different manners of growth of the ſeveral ſorts of fruit-trees; ſome require to be managed one way, while others muſt be treated in a quite different manner; and this is to be known only by practice, and carefully obſerving how each kind is naturally diſpoſed to produce its fruit; ſome ſorts growing on the ſame year's wood, as vines; others produce their fruit for the moſt part upon the former year's wood, as peaches, nectarines, &c. and others upon curſons or ſpurs, which are produced upon wood from three, four, or five, to fifteen or twenty years old, as pears, plums, cherries, &c. In order therefore to manage fruit trees rightly, proviſion ſhould always be made to have ſufficient quantity of bearing wood, in every part of the trees; and, at the ſame time, not to have a ſuperfluity of uſeleſs branches, which would only tend to exhauſt the ſtrength of the trees, and cauſe them to decay in a few years.

Pruning fruit-trees, is founded on the following reaſons: firſt, To preſerve trees longer in a vigorous bearing ſtate: ſecondly, To render the trees more beautiful to the eye: and thirdly, To cauſe the fruit to be larger and better taſted.

1. It preſerves a tree longer in a healthy bearing ſtate; for by cutting off all the ſuperfluous branches, ſo that no more are left upon the tree than are neceſſary, or than can be properly nouriſhed, the root is not exhauſted in ſupplying uſeleſs branches, which muſt afterwards be cut out, whereby much of the ſap will be uſeleſsly exhauſted.

2. By ſkilful pruning of a tree it is rendered much more pleaſing to the eye; but we would not here be underſtood to recommend a ſort of pruning too much practiſed of late; namely, the drawing a regular line againſt the wall, according to the ſhape and figure they would reduce the tree to, and cutting all the branches, ſtrong or weak, exactly to the chalked line; the abſurdity of which will ſoon appear to every one who will be at the pains of obſerving the difference of thoſe branches ſhooting the following ſpring. All therefore we would be underſtood to mean by rendering a tree beautiful is, that the branches are all pruned according to their ſeveral ſtrengths, and nailed at equal diſtances in proportion to the different ſizes of the leaves and fruit; and that no part of the wall, within the extent of the tree, be left unfurniſhed with bearing wood. A tree well managed, though it does not repreſent any regular figure, will ſtill appear very beautiful to the ſight, when it is thus dreſſed, and nailed to the wall.

3. It is of great advantage to the fruit; for the cutting away all uſeleſs branches, and ſhortening all the bearing ſhoots according to the ſtrength of the tree, will render it more capable of nouriſhing thoſe which are left remaining, ſo that the fruit will be much larger, and better taſted. And this is the advantage which thoſe trees againſt walls or eſpaliers have over ſtandards, which are permitted to grow as they are naturally inclined; for it is not their being trained to a wall or an eſpalier, which renders their fruit better than ſtandards, but becauſe the roots have a leſs quantity of branches and fruit to nouriſh, and conſequently their fruit will be larger and better taſted.

Having thus conſidered the nature of pruning in general, we ſhall now proceed to the particular ſorts of trees that require pruning at this ſeaſon of the year.

Prune Standard Fruit-trees.

Such ſtandard fruit-trees, in the orchard and fruit-garden, as require pruning, may be dreſſed this month. You ſhould be careful to cut from thoſe trees all dead wood and very old branches, and all ſuch as grow in a rambling manner acroſs others. Whenever you ſee the branches crowded together, let ſome be cut away, ſo that the principal branches may ſtand clear of each other. At the ſame time be very careful to clear the branches from moſs.

Prune Dwarf Apples, Pears, &c.

If poſſible, let all your apples, pears, and cherries, planted either againſt walls or eſpaliers, be pruned this month.

And in performing this operation, be careful to cut away all the very old branches, and ſuch as are naked, or deſtitute of bearing wood. At the ſame time be careful to leave room ſufficient for training the young wood and full bearing branches to the wall or eſpalier, in a regular and handſome manner.

Wherever you obſerve the branches to ſtand too cloſe together, let the moſt irregular of them be taken away.

If wood be wanting, leave ſome of the beſt ſituated of the laſt ſummer's ſhoots, in order to fill up the vacant places. But where theſe ſhoots are not wanted for the above purpoſe, let every one of them be cut off cloſe to the part from whence they proceeded, leaving no ſpurs but what are naturally produced.

It is neceſſary to obſerve, that the ſhoots or branches of theſe trees muſt not be ſhortened, but left at full length, and in that manner trained cloſe and even to the wall, &c. about ſix inches diſtant from each other.

Prune Gooſeberry and Currant Trees.

If your gooſeberry and currant trees were not pruned laſt month, it muſt be done now. In doing this obſerve to cut away all the irregular branches; that is, all thoſe that grow acroſs, or in a ſtraggling manner from the reſt.

If you obſerve the branches in general to ſtand ſo cloſe as to interfere with one another, let them be thinned out to proper and equal diſtances, ſo that every branch may ſtand clear of the other: they ſhould be, at leaſt, ſeven or eight inches apart.

Gooſeberry

Gooſeberry or currant-trees may be planted any time this month. But they ſhould never be planted nearer than ſeven or eight feet from one another.

Prune Vines.

If you have any vines that were not pruned laſt month, let it be done now, but the earlier the better. Obſerve in pruning vines to cut out the old naked branches, in order to make room for the bearing-wood; which are properly the laſt year's ſhoots. Care muſt therefore be taken to leave a proper ſupply of the ſtrongeſt of the laſt year's ſhoots in every part of the tree. Care ſhould alſo be taken to have a ſucceſſion of young wood coming up regularly from the parts of the vine near the bottom of the wall.

Let the branches or ſhoots in general be left at equal diſtances, and about eight or nine inches from each other.

At the ſame time you muſt obſerve to ſhorten each ſhoot in proportion to its ſtrength, ſome to three, four, or five eyes long, and let the cut be made ſloping, about an inch above and behind the eye.

Raſpberries.

Raſpberries, where any remain unpruned, ſhould, if poſſible, be pruned this month. In pruning raſpberries, obſerve to leave three of the laſt year's ſhoots ſtanding on each root, to bear fruit the next ſummer; but all above that number muſt be cut away cloſe to the ſurface of the ground; and all ſtraggling ſhoots between the rows muſt alſo be taken away. All the dead wood muſt be cleared away.

All the ſhoots that are left ſhould be ſhortened about one third of their original length.

When the pruning is finiſhed, dig the ground between the plants; obſerving as you dig to clear away all the ſtraggling roots, and leave only thoſe belonging to the ſhoots which are left to bear.

If new plantations of raſpberries be wanted, they may be made this month. The plants ſhould be ſet three feet diſtance from each other in the rows, and the rows four feet aſunder.

Strawberries.

Strawberries ſhould now be cleaned, and have their ſpring dreſſing. Firſt pull or cut off all the ſtrings or runners from the plants, and clear the beds from weeds and litter of every kind. When this is done, looſen the ground between and about the plants, adding a little freſh earth between the rows, and cloſe round every plant; this will greatly ſtrengthen the plants, and cauſe them to produce large fruit.

You may now plant ſtrawberries, but the beſt time is in Auguſt and September. Let a proper piece of ground be prepared for theſe plants: if the ſoil be loamy, ſo much the better; but whatever it be, ſome rotten dung muſt be dug in.

Let your ground be now divided into beds four feet wide, with alleys between them at leaſt eighteen inches wide. Let the ſtrawberry plants be ſet in rows a foot aſunder, allowing the ſame diſtance between plant and plant in the rows.

Planting Fruit-Trees.

Fruit-trees of all ſorts may be planted any time this month, when the weather is mild and open.

Peaches, apricots, and nectarines ſhould never be planted cloſer than fifteen feet from one another; but if you allow eighteen feet, it will be ſtill better.

Apples, pears, plums, and cherries, for walls or eſpaliers, ſhould be planted eighteen feet aſunder; twenty will not be too much. For though theſe diſtances ſeem large at firſt, when the trees are ſmall, yet in ſeven years you will be ſufficiently convinced of the benefit that will ariſe from planting them in this manner.

Standard trees ſhould be allowed full thirty feet diſtance: none ſhould be planted nearer in a garden.

Care ſhould be taken in ſetting fruit-trees that they be not planted too deep; for that is a more material article than moſt gardeners imagine. And be very careful to open for each tree a hole large enough to receive all the roots freely, without preſſing them againſt the ſides.

When the holes are dug, and the trees ready to be planted, let their roots be pruned, and ſuch as are broken or bruiſed, taken away. Then ſet the tree in the hole, carefully obſerving that all the roots ſpread freely as they ought to do.

Break the earth well, and throw it in equally about the roots, ſhaking the tree gently that the earth may fall in cloſe between the roots and their fibres; when the earth is all thrown in, tread the earth gently, to fix the tree in a proper poſition.

Let all ſtandard trees be ſupported with ſtakes, as ſoon as they are planted, that the wind may not rock them about.

You muſt alſo ſecure dwarf-trees againſt the power of the wind, by faſtening them to the wall, or rails of the eſpalier.

As ſoon as you have finiſhed your pruning and nailing, let all the fruit-tree borders be neatly dug; or, if they have been dug before, let the ſurface be looſened, where it has been trampled in doing the neceſſary work about the trees. This will be very ſerviceable to the trees, and, at the ſame time, give the borders a clean and neat appearance.

The NURSERY.

You muſt now finiſh your digging the ground between the rows of all kinds of young trees and ſhrubs.

Stocks to Bud and Graft upon.

You ſhould now make new plantations of ſtocks to bud and graft the various kinds of choice fruit upon.

Theſe ſtocks ſhould be planted out as ſoon in the month as poſſible, if the weather will permit.—— Let them be planted in rows two feet and a half aſunder, and fifteen inches at leaſt from one another in the rows.

All the ſtocks that were budded laſt ſummer ſhould now be headed down. This ſhould be done with a ſharp knife, obſerving to cut the head off about four inches above the bud.

Grafting

Grafting.

This curious operation may be performed any time this month, provided the weather be mild.

The moſt proper ſort to begin with are pears, plums, and cherries: and theſe kinds generally ſucceed beſt, when grafted ſome time in the laſt fortnight of this month. Apples may either be grafted at the ſame time, or deferred a fortnight longer.

When grafting is to be performed, you ſhould begin to prepare for it about the beginning of the month.

The firſt thing neceſſary to be done is to collect the grafts. In the choice of theſe the following directions ſhould be carefully obſerved: Firſt, That they are ſhoots of the former year. Secondly, That they are taken from healthy fruitful trees. And, thirdly, That you prefer thoſe grafts which are taken from the lateral or horizontal branches, to thoſe taken from the perpendicular ſhoots. Theſe grafts ſhould be cut off from the trees before the buds begin to ſwell, which is generally three weeks or a month before the ſeaſon for grafting; therefore when they are cut off, they ſhould be laid in the ground with the cut downwards, burying them half their length, and covering their tops with dry litter, to prevent their drying: if a ſmall joint of the former year's wood be cut off with the cion, it will preſerve it the better: and when it is grafted, this may be cut off; for the grafts never muſt be cut to a proper length before they are inſerted into the ſtocks; but till then, the ſhoots ſhould remain their full length, as they were taken from the tree, which will preſerve them better from ſtriking. If theſe grafts are to be carried to a conſiderable diſtance, it will be proper to put their cut ends into a lump of clay, and to wrap them up in moſs, which will preſerve them freſh for a month or longer: but theſe ſhould be cut off earlier from the trees than thoſe which are to be grafted near the place where the trees are growing.

The reaſon for grafting is, that as all good fruits have been accidentally obtained from ſeeds, ſo theſe when ſown will often degenerate, and produce ſuch fruit as are not worth cultivating; but when the ſhoots, cions, or grafts, are taken from ſuch trees as yield good fruit, theſe will never vary from their kind, whatever be the ſtock or tree on which they are grafted.

The moſt proper ſeaſon for grafting is in the ſpring, juſt before the riſing of the ſap, or at leaſt before it riſes in any great quantity: but the weather muſt be neither froſty nor wet; nor ſhould the wind blow very bleak or ſtrong when this operation is performed: for on theſe circumſtances, and upon the exact joining of the inner bark of the cion with the inner bark of the ſtock, ſo that the ſap which flows between the bark and the wood may be communicated from the one to the other, the ſucceſs of grafting chiefly depends.

The implements neceſſary for grafting are, fine ſmall hand ſaws to cut off the heads of large ſtocks; a good ſtrong knife with a thick back to make clefts in the ſtocks; a ſharp pen-knife to cut the grafts; a grafting chiſſel, and a ſmall mallet to pare away the wood; baſs, or woollen yarn, to tie the grafts with; and a quantity of clay, or cement, properly prepared, to lay over the inciſions, in order to prevent their bleeding, and keep out the air.

The method of preparing the clay intended for this purpoſe, is to mix thoroughly together a quantity of ſtrong fat loam, ſome new ſtone-horſe dung broken into ſmall bits, a little tanners hair, or ſtraw, cut very ſmall, with a little ſalt, and as much water as will make the whole of the conſiſtence of pretty ſtiff mortar.

The cement or compoſition which ſome have of late uſed, and which has been found to anſwer the deſign of keeping out the air better than the above clay, is made of turpentine, bees-wax, and roſin, melted together. This compoſition, when of a proper conſiſtence, is laid about a quarter of an inch thick, upon the cut part of the ſtock round the graft: and has this farther advantage over the clay, that there is no danger of its being hurt by froſt; for cold hardens it; and when the heat of ſummer comes on, by which time it is no longer wanted on the tree, it will melt and fall off without any trouble.

Among the ſeveral methods of grafting hitherto known, the following are moſt approved, and generally practiſed.

Cleft-Grafting, called alſo Stock, or Slit-Grafting.

This is uſed chiefly for middle-ſized ſtocks, from one to two inches in diameter. The ſeaſon for it is in the months of February and March; and the method, as now practiſed, is thus:

The head of the ſtock being ſawn, or cut off, with a ſlope, ſmooth and clean, a perpendicular cleft is made therein, about two inches deep, with a ſtrong knife, or chiſſel, from the top of the ſlope, as near to the pith as may be without touching it. In this cleft, the grafting chiſſel, or a wedge, is put to keep it open. The graft or cion is prepared by cutting it aſlope, in form of a wedge, to ſuit the cleft, only leaving a ſmall ſhoulder on each ſide; and when cut, it is to be placed exactly in the cleft, ſo as that the inner bark of the cion may aptly, and cloſely, join to the inner part of the bark, or rind of the ſtock; in the dexterous performance of which, the chief part of the art of grafting conſiſts. That ſide of the cion which is to be placed outward, at the part where it is cut wedge-wiſe and inſerted into the cleft of the ſtock, ſhould be much thicker than the other ſide, the better to facilitate the exact joining of its rind to that of the ſtock; for if theſe two do not unite, the graft will not ſucceed. The rind of the ſtock choſen for this way of grafting ſhould therefore not be too thick; becauſe it will then be the leſs manageable. If the cleft pinches too tight, a ſmall wedge may be left in it to bear the ſtreſs. As ſoon as the graft is properly fixed, the cleft ſhould be cloſely covered over with clay, or, which ſome think better, with moſs, or the freſh bark of a tree bound on with ozier.

When this method, which is the moſt ancient, and moſt common, manner of grafting, is uſed to ſtocks that are not ſtrong, a ligature of baſs ſhould be made around the ſtock, to prevent the opening of its ſlit; and the whole ſhould then be clayed over, or covered with the cement before deſcribed, to hinder the air from penetrating into the ſlit, ſo as to deſtroy the graft, only two eyes of which ſhould here be left above the clay, for ſhooting.

The

The ſtraighteſt and ſmootheſt part of the ſtock ſhould always be preferred for grafting, in whatever way this operation is performed.

Grafting in the Rind, or Shoulder Grafting.

This is likewiſe called ſlicing and packing, to diſtinguiſh it from grafting in the bark, which will next be ſpoken of, and is performed in the following manner, about the latter end of March, or the beginning of April, on more ſlender ſtocks than thoſe which are commonly uſed for cleft-grafting.

The top of the ſtock is cut off in a ſmooth, ſtraight place: then the cion, or graft, is prepared by cutting it on one ſide from the joint, or ſeam, down ſlope-wiſe, making the ſlope about an inch, or an inch and an half long; and obſerving it is bent, ſo that the cion may ſtand nearly upright when it is fixed to the ſtock. At the top of the ſlope, a ſhoulder is made, whereby it is to reſt on the crown of the ſtock. The whole ſlope muſt be plain and ſmooth, that it may lie even to the ſide of the ſtock. The length of the cion uſed here may be about four inches from the ſhoulder, for a ſtandard tree; but for a dwarf, or wall-tree, it may be ſix inches. When the cion is prepared, the outſide of its ſloped end, from the ſhoulder downward, is applied to the weſt, or ſouth-weſt ſide of the ſtock, and its length and breadth meaſured thereon; which done, the bark of the ſtock, (but not any of its wood) is cut away to thoſe dimenſions, that the cut part of the cion may be fitted in as exactly as poſſible. In doing this, regard muſt be had to the bigneſs of the ſtock, and the thickneſs of its bark, in order to proportion thereto the length and breadth of the cut part of the cion; otherwiſe the paſſages of the ſap in the ſtock and cion will not meet, and the cion will then of courſe periſh. When the cut part of the cion is exactly fitted to, and laid on that of the ſtock, they are bound together with woollen yarn, and covered with clay an inch above, and as far below, the head of the ſtock; working it round the cion, till it become ſharp at top, that the rain may run down it.

This method has ſeveral advantages over the former. Among theſe are, that the wound heals up ſooner, and that, in the mean time, it is in leſs danger from the weather: that it does leſs injury to the ſtocks and grafts, by avoiding all ſevere ſplittings and pinchings; that the bark is more eaſily placed in the paſſage of the ſap here, than in the cleft; that the graft thrives and ſhoots with greater vigour, and bears ſooner in this way than in that; and that it is practicable on ſmaller ſtocks than the other, which muſt have a good body, and conſiſtence, before they can bear cleaving.

Grafting in the Bark.

This operation is performed thus. Prepare the ſtock and cion as for grafting in the rind, both as to time and manner; but, inſtead of cutting out the bark of the ſtock, ſlit it down, on the ſouth-weſt ſide, from the top, almoſt as long as the ſloped part of the cion, and at the top of the ſlit looſen the bark with the point of your knife. Then thruſt an inſtrument, made of very hard wood, ivory, ſilver, or the like, and formed at the end like the ſlope-end of the cion, but much leſs, down, between the bark and wood, to make room for the cion; which being put in, the bark is to be ſo managed, as that it may cloſe exactly to the ſtock and edges of the cion, and the whole is then to be bound up, and covered as before.

Whip-Grafting, or Tongue-Grafting.

This is proper for ſmall ſtocks, from an inch diameter to a quarter of an inch, or even leſs. Mr. Worlidge, Mr. London, Mr. Miller, and others, ſpeak of it as the moſt effectual way of any, and that which is moſt in uſe, becauſe the cion covers the ſtock much ſooner in this method than in any other; for here the cion and the ſtock muſt always be of the ſame thickneſs. There are three ways of performing it, and all of them may be practiſed, ſomewhat later than either of the foregoing.

The firſt is, to ſlope the cion off a full inch, or more; then to do the ſame to the ſtock; and afterwards to tie the one to the other, with baſs or yarn, ſo as to join them cloſely at every part, but particularly at the rind; and then to cover the joint carefully with well tempered clay. The baſs uſed for this, or for any other binding, ſhould be taken from a ſound mat, and be ſoaked in water for ſome hours, to encreaſe its ſtrength, and render it the more pliable.

The ſecond way is, to make a ſhoulder in the graft, and, the head of the ſtock being cut off and ſmoothed, to join it as in grafting in the rind.

The third method, which is an improvement of the laſt, is properly named tipping or tonguing. This is done by cutting the ſtock off ſlanting, as before, and leaving at its upper ſide a thin piece, or tongue, as it is called, of the wood, pared away like the lower end of a cion. The cion is then ſloped, and tongued, in the ſame manner as the ſtock, and a ſlit is made in each of them, downward in the ſtock, and upward in the graft, on the ſide oppoſite to the tongue, ſo that each may receive the tongue of the other. The cion is then joined to the ſtock, as cloſely as can be, particularly at the bark; a ligature is made round them with baſs or woollen yarn, and the engrafted part is well covered with clay or cement.

Side-Grafting.

In this, the cion is prepared as in whip-grafting; but the head of the ſtock is not cut off at the time of performing the operation. Inſtead of that, ſo much of the bark as the cion will cover is pared off from the weſt ſide of the ſtock; then both the cion and the ſtock are ſlit in the laſt mentioned manner of whip-grafting, and they are bound together, and cloſed up with clay. At the year's end, the top of the ſtock is cut off at the grafted place, ſlope-wiſe; and the wound is covered with clay or cement.

Crown-Grafting.

This is only practiſed in the larger trees, which are capable of receiving a number of grafts, and are too big to be cloven; for theſe, the head or main branches being cut off horizontally, four or more grafts are placed round the ſtock, between the bark and the rind, ſomewhat in the manner of a crown. The moſt proper time for performing this is about the latter end of March, or the

the beginning of April. After the intended number of cions are inſerted, which is done exactly in the ſame manner as that already delivered for grafting in the rind, the whole crown of the ſtock is well clayed over, and only two eyes of each cion are left uncovered; that being ſufficient for their ſhooting.

This method of grafting was more practiſed formerly than it is at preſent; many people having heen diſcouraged by the ill ſucceſs that has frequently attended their cions, which have been blown out of the ſtock, by ſtrong winds, after they had made large ſhoots, and even after they had grown there five or ſix years. But this accident may be prevented, by tying the cions to ſtakes faſtened to the tree, till they are ſo firmly fixed, as to have almoſt covered the ſtock.

Root-Grafting.

This is a modern invention, the deſign of which is ſomewhat different from that of any of the former methods; this being for the propagation, or multiplication, of plants already fitted to produce their fruit.

To perform this, take a graft, or ſprig, of a young tree, which you intend to propagate, and a ſmall piece of the root of another tree of the ſame kind, or of a like genus, and whip-graft them together; obſerving that the but-ends of the graft and root be well united, and that the rind of the root joins cloſely to that of the graft. Theſe may, afterwards, be planted out at pleaſure, and the piece of root will collect the nutritive juices, and feed the graft, as the ſtock does the other way.

This method of propagation is very eaſy and expeditious; roots being more plentiful than ſtocks: by this means the pieces of roots of one crab-ſtock, for example, or of one apple-ſtock, will ſerve for twenty or thirty apple-grafts; and the like of other trees It is alſo an excellent way for raiſing of tender trees, which will hardly bear being grafted in the ſtock. Add, that trees thus grafted bear ſooner, and are more eaſily dwarfed than thoſe done any other way.

The only objection againſt this method is, that the young tree grows but ſlowly at firſt, which is occaſioned by the ſmallneſs of the root that feeds the graft; for in all trees the head muſt follow the encreaſe of the roots, from whence it hath its nouriſhment.

Reiterated Grafting, or Grafting by a double or triple inciſion.

This is another method mentioned by Agricola, whoſe work, though chimerical enough in many reſpects, contains, notwithanding, ſeveral goods things. To performs this, firſt graft a good cion on a ſtock, and cut it away to one half, or a third part; then fix to that remaining part of the cion another graft, of a better kind; and to that a third; for the oftener the tree is grafted, the finer fruit it produces.

By this method the author above-mentioned aſſures us, that he produced muſcat pears, which were admirable, making at firſt uſe of a ſtock grafted with a pound-pear, on which he grafted a ſummer bon-chretien; and when the branch of this laſt had ſhot, he grafted on it a cion of a bergamot, which he alſo cut, and grafted on it a cion of a muſcat pear.

Grafting of Branches.

This is alſo commended by Agricola, as a very certain and profitable operation; beſt practiſed on large, or full-grown, and even old trees.

To do this, half or more of the branches muſt be lopped off, and grafts of three or four years old be applied to them, taking care to have ſtakes, or other things, to ſupport them againſt the wind, &c.

He adds, that by this method you will have, perhaps, the ſame year, or at leaſt the ſecond or third, ſuch a quantity of fruit, as the youngeſt and ſoundeſt tree would hardly produce.

Grafting by approach, called alſo Inarching, and Ablactation.

This is uſed only when the tree intended to be grafted, and that from which the graft is to be taken, ſtand ſo near, or can be brought ſo near to each other, that they may be joined together. The method of performing it is this: the branch to be inarched is fitted to that part of the ſtock where it is to be joined; the rind, and part of the wood, of one ſide of that branch, is then parted away, very ſmooth and even for the length of three inches; and afterwards the other branch, which is to ſerve for the ſtock to which the graft is to be united, is ſerved in the ſame manner, ſo that the two may join cloſely and equally together that the ſap veſſels may meet. A little tongue is then cut upwards in the graft, and a ſlit is made in the ſtock to receive it; ſo that when they are joined, the tongue prevents their ſlipping, and the graft is the more cloſely united to the ſtock. When they are thus placed exactly together, they muſt be tied with baſs, worſted, or ſome other ſoft thing; and the place of junction muſt be well covered over with grafting clay, to prevent the air from drying the wound, and the wet from rotting the ſtock. A ſtake muſt alſo be fixed in the ground, and both the ſtock and the graft muſt be tied thereto, to prevent their being diſplaced by the wind. When they have remained in this ſtate four months, they will be ſufficiently united, and the graft may then be cut off from the mother-tree, obſerving to ſlope it cloſe to the ſtock. It is of great ſervice to the graft then to lay a freſh coat of clay all round the grafted or joined part. This operation ſhould be performed in April or May, that the graft may be perfectly united to the ſtock, before the enſuing winter. It is chiefly practiſed upon oranges, myrtles, jaſmines, firs, pines, and ſome other trees, which do not ſucceed well in the common way of grafting or budding. But though orange trees are here mentioned among the reſt, this practice is not to be adviſed for them, or for any other trees, if they are intended to grow large; for that they hardly ever do in this method; and accordingly it is ſeldom uſed but for the curioſity of having a young plant with fruit upon it, in a year or two from its having been raiſed from the ſeed. This is, indeed, effected by inarching a bearing branch into a young ſtock: but the plant ſo treated ſeldom lives long.

The walnut, fig, and mulberry, will alſo take by this method of grafting, though neither of them will ſucceed in any other way; but ſtill they, like all other trees that are thus managed, will remain weak, and ſtinted in their growth, beſides the ſhortening of their otherwiſe uſual time of duration.

All grafts, particularly of young cions, are subject to be injured by birds: but that may be prevented by binding some small bushes about the tops of the stocks.

The binding of the grafts, whether it be of bass or yarn, should be loosened at least, if it be not entirely taken off at Midsummer, or thereabout, lest its then too great tightness (as the stock will have encreased in bulk, and the binding, perhaps, have been swelled, and consequently shrunk by the weather) should injure the plant.

Propagating by Layers.

This is the best season for laying down the branches of all kinds of exotics and shrubs.

Layers may also be now made of all such hardy shrubs and trees as are encreased by this method, provided it was omitted between Michaelmas and Christmas; and it will succeed with many kinds.

In order to form layers of any kind of trees or shrubs, let the ground be dug round the plant that is to be laid; and as you proceed bring down the shoots or branches regularly, and lay them along in the ground, fastening them securely there with hooked pegs. This being done, let all the young shoots on each branch be neatly layed and covered three or four inches deep with earth, leaving the top of each three or four inches out of the ground.

By next Michaelmas most kinds of layers that are layed now will be tolerably well rooted, and fit to be transplanted.

Transplant Layers.

Let the layers of such trees and shrubs as were layed down last year, and not yet taken off, be now separated; and as soon as taken off, trimmed and planted in rows in an open situation. The rows should be eighteen or twenty inches asunder, and the plants set at about fifteen inches from each other in the rows.

Plant Cuttings of Gooseberries and Currants.

The best method of propagating gooseberries and currants is by cuttings, and this work may now be performed.

Observe to take your cuttings from such of the last year's shoots as are strong. They should be from ten to twelve or fifteen inches in length. Let them be planted in rows twelve inches at least asunder, and set each cutting about half way into the ground.

Experience has sufficiently shewn that gooseberries and currant-trees raised from cuttings always produce fruit remarkably large and well tasted; while the fruit produced by trees raised from suckers is generally small and ill tasted.

Plant Cuttings of Honey-suckles.

This is still a good season for planting the cuttings of honey-suckles and other hardy flowering shrubs and trees.

The cuttings should be shoots of the former year's growth; let the strongest shoots be chosen for this purpose; and let them be from six to twelve inches long. Plant these in a shady situation, in rows twelve inches asunder, and six or eight between each in the rows. They must be set about half way in the earth.

By next October, most of the cuttings planted now, will be sufficiently rooted, and therefore may be removed at that season.

Transplant Flowering Shrubs.

Flowering shrubs of all kinds may be now safely transplanted, provided the weather be mild and open. Observe to let the whole of this work be completed by the latter end of this month, if the weather will permit.

Transplant hardy Fruit and Forest Trees.

All kinds of hardy fruit and forest trees may be removed any time this month; but the sooner it is done the better, provided the weather be mild and open.

Pruning.

All flowering-shrubs that want pruning must now undergo the operation; for you must finish your pruning this month.

You should observe to train all your plants with a single stem; and if you find their heads growing irregular, cut out or shorten such shoots as you think necessary, in order to form the head into some handsome form.

Be careful to take away all suckers that rise from the roots of any kind of shrubs. The best of them may be planted out at proper distances, and in two or three years time, they will become good plants.

Sow the Stones of Plums, &c.

The stones of plums, and kernels of other fruits, should now be sown in order to raise a supply of stocks to bud and graft upon.

The sooner they are sown in the month the better, provided the weather be mild and open. Let the spot chosen for this purpose be in a sheltered situation, and the soil perfectly clean and light. The stones should be sown on beds about four feet wide, and covered about an inch deep with earth.

The PLEASURE or FLOWER-GARDEN.

Sow the Seeds of the Auricula and Polyanthus.

The seeds of the auricula and polyanthus may be sown any time this month, when the weather is mild and open. The plants will rise freely from this sowing, and thrive well. A warm spot of ground should be chosen for the purpose, unless you chuse to sow the seed in pots or boxes filled with rich light earth.

But which ever method be used, the seeds should be sown tolerably thick, and covered about a quarter of an inch deep with rich light earth.

If the seeds are sown in pots or boxes, place them in a situation well defended from the northerly winds, and open to the morning and mid-day sun: in about two months they must be removed into a more shady situation.

Sow curious Annual Plants.

The choicest kind of annual plants, such as double balsams, cockscombs and tricolars, globe amaranthus,

marvel of Peru, diamond fico'des, or ice plants, egg plants, China aſters, &c. require a hot-bed in order to their blowing early in any tolerable degree of perfection.

Let therefore ſome new horſe-dung be thrown up in a heap about the middle of this month, and in about eight or ten days it will be in a proper condition for making the bed; which ſhould be about two feet and a half thick of dung. Let the ſurface be levelled, and the frame and glaſſes placed upon it.

As ſoon as the burning heat of the bed is over, lay on a quantity of rich, light, and perfectly dry, earth, ſufficient to cover the bed five or ſix inches deep.

Make the ſurface of the earth level and ſmooth, and ſow the ſeeds on the ſurface, each ſort ſeparate, covering them about a quarter of an inch deep with light earth, well ſifted. Let the glaſſes be covered over night with mats; and give the plants now and then little ſprinklings of water.

Sow Ten Week Stocks.

A little of the ſeed of ten-week ſtocks may be ſown at the latter end of the month, in order to raiſe a few plants for blowing early in the ſummer.

It will be beſt ſown on a ſlight hot-bed, as the plants will be much ſtronger, and flower three weeks or a month earlier than they would otherwiſe do. But as the plants are tolerably hardy, they may be ſown in a warm border.

Let the ground be neatly dug, and the ſeed ſown tolerably thick, in a bed about three feet broad. Arch the bed over with hoops, and cover it every night with mats in bad weather. If you have a ſpare frame and glaſs to cover the bed, or hand-glaſſes for the plants, they will thrive the better.

Sow hardy Annual Flowers.

If the weather be mild, dry, and open, about the latter end of the month, many ſorts of annual flower-ſeeds may be ſown in the warm borders, and other parts of the flower-garden; particularly the lark-ſpur, flos adonis, convolvulus, lupines, ſweet ſcented and Tangier peas, candy tuft, dwarf lychnis, Venus looking-glaſs, Venus navel-wort, Lobel's catchfly, dwarf poppy, dwarf annual ſun-flower, oriental-mallow, lovetera, hawk-weed, &c.

You muſt obſerve to ſow all the above ſeeds in the places where the plants are intended to flower; for they will not ſucceed if tranſplanted.

The beſt method therefore of cultivating theſe annual flowers is this: dig with a trowel, at proper diſtances, ſmall patches of about eight or nine inches over, breaking the earth very fine, and laying the ſurface even. When the ground is thus prepared, draw a little of the earth off the top to one ſide, ſow the ſeeds thin, and cover them with the earth that was drawn off; the ſeeds ſhould be covered about half an inch deep; but the larger, as the ſweet peas, &c. near an inch.

When the plants appear, let them be judiciouſly thinned, by taking away the weaker and leſs promiſing plants, that the remainder may have proper room to grow and flouriſh.

Tranſplant Flowering Shrubs.

If the weather be mild and open, you may at any time this month, ſafely tranſplant moſt ſorts of flowering ſhrubs, particularly the gelder-roſe, ſyringas, laburnum, lilacs, honey-ſuckles, roſes, ſpiræas, althæa-frutex, hypericum-frutex, Perſian-lilac, double-bloſſom cherry, double flowering-peach, almonds, flowering raſpberries, double bramble, cornelian cherry, and double hawthorn. Bladder-ſena, ſcorpion-ſena, privet, Spaniſh-broom, jaſmines, ſumach; cytiſuſes, acacias, and many other ſorts of hardy plants, may be now tranſplanted.

Tranſplant hardy fibrous-rooted Flowering Plants.

Moſt of the fibrous-rooted flowering plants, particularly the polyanthuſes, primroſes, London-pride, violets, double-daiſies, double-camomile, thrift, gentianella, hepaticas, ſaxifrage, &c. may be removed to the proper ſituations.

You may alſo now remove roſe-campion, rockets, campanula, catchfly, ſcarlet-lychnis, double-feverfew, batchelors-button, ſweet-williams, columbines, Canterbury-bells, monkſhead, greek-valerian, tree-primroſe, fox-glove, golden-rod, perennial aſters, perennial ſun-flower, holly-hocks, French honey-ſuckles, and ſeveral others of that kind.

But you ſhould remember in planting the above, or indeed any other flowering plants, to mix them in ſuch a manner, that, during the flowering ſeaſon, there may be both a variety of colours, and a regular ſucceſſion of flowers in the different parts of the garden where they are planted.

Tranſplant Carnation Plants.

The choiceſt carnation plants may, about the latter end of the month, be removed into the pots where they are intended to blow, provided the weather be mild and open.

Let the pots be filled with rich light earth, then take up the plants, with as much earth as will readily hang about their roots. Set a ſingle plant in the middle of each pot, and cloſe the earth well about the body of the plants, giving them immediately a moderate watering, by which the plants will be properly ſettled in their places.

You muſt remember to place the pots, as ſoon as the flowers are planted, in a ſituation properly defended from the cold winds.

Tranſplant Evergreens.

Moſt of the hardy kinds of evergreen-ſhrubs and trees, particularly phillyreas, yews, evergreen-oaks, junipers, hollies, firs, cypreſs, cedars, lauriſtinus, pyracanthas, arbutus, &c. may be tranſplanted any time this month when the weather is mild.

Care ſhould be taken to diſpoſe the moſt curious ſorts of flowering ſhrubs and plants in ſuch a manner, that they may be eaſily ſeen from the walk or lawn near which they are planted. You ſhould alſo be careful not to plant them too cloſe together, nor ſuffer them, as they grow up, to interfere with one another; becauſe great part of the pleaſure of ſeeing theſe ſhrubs

to

to advantage, will, if they ſtand too cloſe together, be deſtroyed.

Tranſplant Box.

If box be wanted for edgings, borders, or to ſupply gaps in edgings formerly made, it may be ſafely planted, in mild weather, any time this month; it will take root readily, and there is no fear of ſucceſs.

Dreſs Auricula Plants.

The choiceſt ſorts of auricula plants in pots muſt now be treated with more than ordinary care, as their flower-buds will ſoon begin to appear; the plants muſt therefore be carefully defended from froſt and cold heavy rains, by covering them with canvas, mats, or glaſſes. But remember to let them be entirely uncovered every mild and dry day.

They muſt alſo be carefully dreſſed; and if ſome freſh earth were not added laſt month, let it be done now, and the ſooner the better.

Tulips, Hyacinths, &c.

Let the beds of tulips, hyacinths, anemonies, and ranunculuſes, be carefully defended from froſts and heavy rains; and thoſe in which the choiceſt ſorts are planted, be now, unleſs done before, arched over with hoops, and covered with mats or canvas, in froſty and extreme wet weather.

Prune Flowering Shrubs.

You muſt now finiſh your work of pruning flowering ſhrubs and evergreens.

Obſerve, in doing this work, to cut all the dead wood, and either to ſhorten or cut off cloſe all ſtraggling irregular branches, and thoſe which interfere with other ſhrubs; for every ſhrub ſhows itſelf to the greateſt advantage, when it is clear of any other.

When the pruning is finiſhed, and the cuttings cleared away, let the ground be neatly dug between and about the plants, obſerving to take off all ſuckers ariſing from the roots.

Dreſs the Borders, Beds, &c.

All flower-borders and beds in general, ſhould now be thoroughly cleaned from weeds, and every kind of litter. Let therefore the ſurface of the beds and borders be carefully looſened with a hoe in a dry day, and neatly raked. This will give the whole an air of livelineſs, which is always very pleaſing to the eye.

Mow Graſs-Walks and Lawns.

One neceſſary requiſite in rendering graſs-walks and lawns beautiful is neatneſs. The ſeaſon for mowing them now begins to approach; let them therefore be polled and rolled once or twice every week. A wooden roller is beſt to take up the worm caſts; but when theſe are taken away, the walk ſhould be rolled with an iron or ſtone roller, in order to render the bottom firm, and the ſurface ſmooth and even.

Turf.

You may, any time this month, lay turf, where it is wanted, either to make new, or mend old walks. Obſerve to beat it well, and roll it with a heavy roller now and then, in order to make it firm and even; and it will grow freely with very little trouble.

MARCH.

Work to be done in the KITCHEN-GARDEN in March.

Cucumbers and Melons.

BE very careful to examine frequently the ſtate of your cucumber and melon hot-beds, with regard to the degree of heat; for it muſt be both lively and moderate, to preſerve the plants in a ſtate of free growth. If this be properly regulated, the plants will ſhew a plenty of fruit, which will grow to a handſome ſize.

If you find the heat too faint, let a lining of freſh horſe-dung be applied either to the back or front ſides of the bed; but if the heat be not much declined, a lining on one ſide will be ſufficient at a time; but let the other be lined about ten or twelve days after. Let the linings be eighteen or twenty inches thick, and raiſed about five or ſix inches up the frame. The top muſt be covered with earth about two inches thick, to keep down the ſteam.

Remember to let the plants have freſh air every day, and to raiſe the glaſſes in proportion to the heat of the bed, and the warmneſs of the weather.

Let a bottle or two of water be kept always in the frame, to be in readineſs to refreſh the plants now and then. The beſt time for doing this is from ten to two o'clock in a mild ſunny day; but let it always be done moderately.

The glaſſes ſhould be covered every night with mats, and uncovered in the morning about an hour and a half after the ſun.

Some ſeeds of cucumbers and melons ſhould be ſown at three different times this month, viz. at the beginning, middle, and latter end, that a continual ſucceſſion of plants may always be in readineſs, either to plant into new beds, or to ſupply the place of ſuch as may fail in others.

At the beginning of this month you ſhould make hot-beds for planting out the cucumber and melon plants that were ſown in January.

It has already been obſerved, that the ſucceſs will, in a great meaſure, depend upon the due preparation of the dung, before it is made into a bed. Let the bed be about three feet high; the dung beaten down well with the fork, when laid on the bed, but not trodden: when the bed is finiſhed, put on the frame and lights, and let it be managed in every reſpect as before directed in the former month. The ſame directions will alſo be ſufficient for managing the plants, whether cucumbers or melons.

If dung could not conveniently be procured for making hot-beds for early cucumbers or melons, laſt month; it is not yet too late, provided the bed be made about the beginning of the month: for the fruit from the ſeeds ſown now will be ready to cut by the middle or latter end of May.

The cucumber and melon plants intended to be reared under hand or bell-glaſſes, ſhould be ſown about the middle of this month.

Cauliflowers.

Let thoſe cauliflower plants as have ſtood all the winter in frames or hot borders, be now tranſplanted.

The ground for this purpoſe ſhould be well trenched, and a good quantity of rotten dung buried in the trenches. Then level the ground; and if it be naturally a wet ſoil, raiſe it up in beds about two feet and a half, or three feet broad, and four inches above the level of the ground; but if the ground be moderately dry, it need not be raiſed at all.

Let the moſt promiſing plants be ſet in the beds prepared as above in rows two feet and a half aſunder, allowing the ſame diſtance between plant and plant in the rows.

Draw up ſome of the earth to the ſtems of cauliflower plants, under hand or bell-glaſſes, taking great care that none of the earth fall into their hearts; this will at once ſtrengthen the plants and promote their growth. But remember to give them air by raiſing the glaſſes on props an inch or two in height; and when gentle ſhowers fall, take the glaſſes entirely away, for this will greatly refreſh the plants.

Should there be more than one or two plants under each glaſs, let them be removed the beginning of this month: for never more than two plants at moſt ſhould be ſuffered to grow under one glaſs. And if the glaſſes are ſmall, one only ſhould remain.

Thoſe cauliflower plants which were raiſed from ſeed ſown the laſt month, ſhould now be pricked into a ſlight hot-bed, which will bring them forward amazingly. Let the bed be eighteen inches high, and either covered with a frame, or arched over with hoops. Cover the bed with rich earth ſix inches deep, prick the plants therein at two or three inches apart, and refreſh them with a little water. Every mild day let the glaſſes or other covering be taken off, but the bed kept covered every night.

At the beginning of this month cauliflower ſeed may be ſown on a ſlight hot bed, where the plants will ſoon come up, and flouriſh.

You may alſo ſow cauliflower ſeeds in a natural bed of rich light earth, provided the ſituation be warm; but the plants, though they will grow freely, will be near a fortnight later than thoſe ſown upon a ſlight hot-bed.

Cabbages.

Cabbage plants of all kinds may be ſet any time this month, but the ſooner it is done the better. They ſhould be planted in good ground, at about two feet and a half diſtance every way.

It muſt however be remembered, that this diſtance is to be underſtood of ſuch plants as are intended to grow to their full ſize; for eighteen or twenty inches will be ſufficient for thoſe which are intended to be cut up young.

The ſeeds of cabbages intended for autumn and winter uſe, may be ſown any time about the middle of the month; obſerving to ſow each ſort ſeparate, and in an open ſpot of ground.

About the middle or latter end of the month, a little red cabbage ſeed may be ſown, in order to raiſe plants for the winter.

Savoy ſeed, for a principal crop intended to ſerve the family from about Michaelmas to Chriſtmas, ſhould be ſown, in an open ſituation, about the latter end of the month.

Carrots and Parſneps.

Carrot and parſnep ſeed, if not ſown laſt month, ſhould be ſown at the beginning of this, for a principal crop.

Carrots delight in a deep, warm, light, ſandy ſoil, which ſhould be dug two ſpades deep, that the roots may run down with greater eaſe; for if they meet with any obſtruction, they are very apt to grow forked, and ſhoot out lateral roots, eſpecially where the ground is too much dunged the ſame year the carrots are ſown, which will alſo occaſion their being worm-eaten. When therefore there is a neceſſity for dunging it the ſame year the carrots are ſown, the dung ſhould be well rotted, and thinly ſpread over the ground; and in the digging of it into the ground, great care ſhould be taken to diſperſe it through the different parts, and not to bury it in heaps. When the ground is inclinable to bind, too much care cannot be taken to break and divide the clods; large ſpits therefore ſhould never be taken in digging for carrots; they ſhould be very thin, and the clods well broken.

The ground, when dug, ſhould be laid level and even, otherwiſe, when the ſeeds are ſown, and the ground is raked over, part of the ſeeds will be buried too deep, and others in danger of being drawn up into heaps; by which means the plants in ſome places will come up in bunches, and in others the ground will be naked; both which ſhould be always carefully avoided.

As theſe ſeeds have a great quantity of ſmall forked hairs upon the borders, by which they cloſely adhere, ſo it is very difficult to ſow them even, or prevent their coming up in patches; the ſeeds ſhould therefore be well rubbed with both hands before they are ſown, in order to ſeparate them. A calm day alſo ſhould be choſen to ſow them; for if the wind blows, it will be impoſſible to ſow the ſeeds equal; becauſe, as they are very light, they will be blown into heaps. When the ſeeds are ſown, the ground ſhould be trodden pretty cloſe, to bury them, and then raked ſmooth and level.

When the plants are come up, and have got four leaves, the ground ſhould be hoed with a ſmall hoe three inches wide, cutting down all young weeds, and ſeparating the plants to three or four inches diſtance each way, that they may get ſtrength. When the weeds begin to grow again, the whole ſhould be hoed over a ſecond time, when care ſhould be taken not to leave two carrots cloſe to each other, and alſo to ſeparate them to a greater diſtance, cutting down all weeds, and ſlightly ſtirring the ſurface of the ground in every part, which will at once prevent freſh weeds from ſpringing up, and facilitate the growth of the carrots.

Sowing

Sowing Turnips.

About the middle, or towards the latter end of this month, as the weather is more or leſs favourable, turnips ſhould be ſown in a light ſoil, and open ſituation. They may indeed be ſown at the beginning of the month, if thought neceſſary; but it ſhould be remembered, that thoſe which are ſown ſo early are apt to run to ſeed before they apple, or, at leaſt, before they obtain any conſiderable ſize.

Sow Onions, Leeks, &c.

The ſeeds of onions and leeks intended for the principal crop, ſhould, if not done in February, be ſown the beginning of this month. Let each ſort be ſown on ſeparate beds of rich mellow earth, and raked in evenly, that the plants may come up equally in every part.

If the earth be very light and rich, the ground ſhould, as ſoon as the ſeeds are ſown, be trodden all over, and then well raked, in order that the ſeed may be buried more regularly.

But where the ground is any thing wet and ſtiff, it will not be ſo proper to tread the ſeed in. The ground ſhould therefore be divided into beds of four, five, or ſix feet wide, with alleys between them; and in theſe alleys the gardener ſhould ſtand to ſow the ſeed, and afterwards to rake it into the ground. Some, for the more certainty of burying the ſeed, throw a little of the earth in the alleys over it, and then lightly rake the whole.

Sow Radiſhes.

Let ſome radiſhes be ſown at three different times this month; viz. at the beginning, the middle, and the end, that there may not be wanting a freſh ſucceſſion of young radiſhes for the table. The ſpot where the ſeed is ſown at this ſeaſon ſhould be open, the ſoil good, and ſomewhat moiſt.

The crops of early radiſhes ſhould now be thinned where the plants ſtand too cloſe together, by pulling up the worſt, and leaving the beſt plants, at about two or three inches diſtance. At the ſame time the bed ſhould be cleared from weeds.

Theſe early crops ſhould alſo be frequently watered in dry weather; otherwiſe they will grow but poorly, and, at the ſame time, the roots be hot and ſticky.

Sow Spinage.

About once every fortnight ſome ſpinage ſeed ſhould be ſown, that there may be a regular ſupply for the table; for one ſowing will not continue above a fortnight before it will run to ſeed. The ſeed ſhould be of the round leaved kind, ſown thin in an open ſpot, and raked in equally.

The plants of the early crop of ſpring ſpinage ſhould now be thinned, ſo that the plants may be five or ſix inches diſtance from one another.

The crop of winter ſpinage ſhould be kept clear from weeds, and the earth between the plants ſtirred with a hoe.

Sow Lettuce.

Lettuce-ſeed of different kinds ſhould be ſown about the beginning, middle, and latter end of the month, that there may be a conſtant ſupply for the table.

Let the ſeeds be ſown in an open ſpot of ground, a rich ſoil, and the earth well broken. Sow the ſeeds evenly on the ſurface, and rake them in lightly, taking care to lay the ſurface ſmooth and level.

Thin thoſe lettuce plants which have ſtood the winter in warm beds or borders, where they ſtand too cloſe. But remember to do this regularly, drawing out the weaker and letting the ſtronger plants remain, at about ten or twelve inches from one another. At the ſame time looſen the earth between the plants with a hoe, and clear away all the weeds and litter from the beds and borders.

The plants drawn out ſhould be planted in an open ſpot of rich earth, at about twelve inches from one another.

Sow Aſparagus.

Let the ſeeds of aſparagus be ſown this month, either to make new plantations the following year, or for raiſing beds of that vegetable immediately from the ſeed.

You ſhould be very careful to procure good ſeeds of aſparagus, as the ſucceſs of the whole plantation will greatly depend upon that particular. In order to this, a ſufficient quantity of the faireſt buds ſhould be marked early in the ſpring, and permitted to run up for ſeed; for thoſe which run up after the ſeaſon for cutting the aſparagus is over, are generally ſo backward as not to ripen their ſeeds unleſs the ſummer be warm, and the autumn very favourable. In the choice of buds for their ſeed, great regard ſhould be had to their ſize and roundneſs, never leaving any that are inclinable to be flat, or that ſoon grow open-headed; let therefore the roundeſt and cloſeſt-headed be choſen. But as ſeveral of theſe will produce only male flowers, which are barren, a greater number of buds ſhould be left than might be neceſſary, if there could be a certainty of their being all fruitful. When the buds are left, it will be proper to thruſt a ſtake down by each, taking care not to injure the crown of the root. Theſe ſtakes will not only ſerve as marks to diſtinguiſh them from others, when they are all run up, but alſo to faſten the ſhoots to when they have advanced in height, and put out lateral branches; this caution will prevent their being broken by the wind, which otherwiſe frequently happens, before the other ſhoots are permitted to run up; after which there is indeed little danger, as they will then be ſheltered by the other ſtalks.

Towards the latter end of September the berries will be fully ripe, when the ſtalks ſhould be cut down, and the berries ſtripped off into a tub, where they ſhould remain three weeks or a month to ſweat, by which means the outer huſks will be rotten. Then fill the tub with water, and break all the huſks by ſqueezing them between your hands. The huſks will now all ſwim upo the water, and the ſeeds ſink to the bottom; ſo that by pouring the water off gently, the huſks will be carried away with it; and by pouring in freſh water two or three times, and ſtirring the whole about with your hands, the ſeeds will be entirely clean. Let the ſeed be now ſpread upon a mat or cloth, and expoſed to the influence of the ſun and air in fine weather, till it is perfectly dry; when it ſhould be put into a bag, and hung up, in a dry place, for uſe.

The ſeed being thus procured, a plantation of aſparagus may be raiſed immediately from the ſeed; and this is a very good method, though the beds will require a year longer, before any buds can be cut, than thoſe which are planted with roots: but as the roots of aſparagus always ſend forth many long fibres, which run deep into the ground, ſo when the ſeeds are ſown where they are to remain, theſe roots will not be broken or injured, as thoſe muſt be which are tranſplanted; they will therefore ſtrike deeper into the ground, and make much greater progreſs. At the ſame time the fibres will puſh out on every ſide, which will cauſe the crown to be in the center; whereas in tranſplanting, the roots are rendered flat by the ſide of the trench.

The ground where you intend to make aſparagus beds, ſhould be trenched, and a good quantity of rotten dung turned equally at the bottom of each trench. It will be neceſſary to dig the trenches ſo deep, that the dung may be buried fifteen inches below the ſurface of the dug ground. Then level the whole ſpot very exactly, taking away all large ſtones, and divide it into beds four feet wide, with aileys two feet wide between them.

The ground being thus prepared, draw a line acroſs it, and with a dibble make holes at a foot diſtance, and about half an inch deep. Into each of theſe holes drop two or three ſeeds, leſt one of them ſhould miſcarry, and cover the ſeed by ſtriking the earth in upon it. Remove the line a foot further for another row, and proceed in this manner till the whole ſpot is ſown. Some time after the plants appear, they muſt be thinned, leaving only two of the ſtrongeſt plants in each hole; and afterwards thinned a ſecond time, leaving only one plant in each hole.

If the ſeed be only intended for raiſing plants for new plantations, or ſupplying deficiencies in others, it ſhould be ſown on a ſpot of rich light earth; and when the plants come up they muſt be kept perfectly free from weeds, by a careful hand-weeding, and now and then refreſhed with water in dry weather.

Planting Aſparagus.

New plantations of aſparagus may be made any time this month when the weather is mild and open.

In order to this the ground muſt be trenched, prepared, and divided into beds, in the manner above directed for raiſing aſparagus from ſeed.

The beds being finiſhed, ſtrain your line, and open four drills with a ſpade from one end of the bed to the other, twelve inches aſunder; obſerving that the two outſide drills be not nearer the ſide than ſix inches; and when you have opened one drill, to plant that before you open another.

Place the plants ten or twelve inches aſunder, and nearly upright againſt the back of the trench or drill, and in ſuch a manner that the crown of the roots may lie between two and three inches below the ſurface of the ground, and be all placed at an equal depth; ſpreading their roots in a regular manner, drawing, at the ſame time, a little earth up againſt them with the hand, in order to fix the plant in due poſition. When one drill is thus planted, draw the earth immediately into the drill over the plants with a rake; and then proceed to open another drill, planting and covering it in the ſame manner; and ſo on till the plantation is finiſhed. When the whole is planted, let the ſurface of the beds be raked ſmooth, and cleared from ſtones; driving into the corner of every bed a firm ſtake, as a mark for the alleys.

The gardeners about London generally ſow a thin crop of onions the firſt year on their new aſparagus beds; nor will this hurt the aſparagus in the leaſt, provided the onions are not ſuffered to grow too near the plants.

A common error has long prevailed, that the dung uſed for manuring the beds, communicates a ſtrong rank taſte to the aſparagus; but this is a great miſtake, the ſweeteſt aſparagus growing upon the richeſt ground, while that growing on poor ground has the rank taſte ſo often complained of. Nor is this to be wondered at, when it is remembered that the ſweetneſs of aſparagus is owing to the quickneſs of its growth, which is always proportioned to the goodneſs of the ſoil, and the warmth of the ſeaſon. Mr. Miller tells us, that in order to prove this he planted two beds of aſparagus upon ground which had been dunged a foot thick; and the beds were every year after dunged extremely well; and the aſparagus produced from theſe beds were much ſweeter than any he could procure, though they were boiled together in the ſame water.

Dreſs Aſparagus Beds.

About the middle of the month fork up your aſparagus beds; taking particular care that the fork does not reach the crowns of the roots.

Some time after the beds ſhould be raked even; but remember not to defer it longer than the end of the month, or at fartheſt the firſt week in April; for by that time the buds will begin to advance near the ſurface, and, conſequently, be in danger of being injured by the teeth of the rake.

Planting Artichokes.

In order to make a new plantation of artichokes, let the ſurface of the ground you intend for this purpoſe be ſpread over with rotten dung, and dug in. When the ground is thus prepared, a ſufficient quantity of young ſhoots ſlipped from old roots muſt be procured. Let theſe ſhoots, taken from old ſtocks, be clear, ſound, and not woody, having ſome fibres to their bottom; then with your knife cut off that knobbed woody part which joined them to the ſtock; and if that cuts criſp and tender it is a ſign of their goodneſs, but if tough and ſtringy, throw the ſhoot away as good for nothing. Cut off alſo the large outſide leaves of the plants intended for planting, pretty low, that the middle or heart leaves may be above them.

Your plants being thus prepared, they ſhould, if the weather be dry, or the ſhoots any time taken from the ſtocks, be ſet upright in a tub of water three or four hours, which will greatly refreſh them. This being done draw a line acroſs the ground that the ſhoots may be ſet in a row, and with a meaſure-ſtick plant them at two feet diſtance from each other in the rows, and the rows five feet aſunder, if deſigned for a full crop. The plants ſhould be ſet about four inches deep, and the earth cloſed very faſt to their roots; obſerving, if the ſeaſon grows dry, to water them two or three times a week, till they have taken root, after which they will require none.

Thoſe artichokes which are planted in a moiſt rich ſoil, will always produce the largeſt and beſt fruit, which will be fit for the table in Auguſt and September; ſo that where ſuch a ſpot can be found, it will be proper to make a freſh plantation every ſpring, to ſucceed the old ſtocks, and ſupply the table in autumn. But the roots will not live through the winter in a very moiſt ſoil; ſo that the ſtocks intended to remain to ſupply the table early, and furniſh you with plants, ſhould be in a drier ſituation. You ſhould alſo remember to plant artichokes in an open ſpot of ground, not under the drip of trees; for they will there draw up very tall, and produce only ſmall inſignificant fruit.

Dreſs Plantations of Artichokes.

About the beginning or middle of the month, according to the earlineſs of the ſeaſon, or the forwardneſs of the old artichoke ſtocks, the plantation muſt be dreſſed in the following manner.

Remove with your ſpade all the earth from about the ſtock, down below the part where the young ſhoots are produced, clearing away the earth from between the ſhoots, ſo as to be able to judge both of the goodneſs of each, and their proper poſition upon the ſtock. Then make choice of two of the cleareſt, ſtraighteſt, and moſt promiſing ſhoots produced from the under part of the ſtock; for theſe are far preferable to the ſtrong thick plants which generally grow upon the crown of the roots, theſe having hard woody ſtems, and never produce good fruit. The market gardeners about London call them rogues, from their having very little bottom, and the ſcales of their heads being placed irregularly. When you have made choice of two plants, ſlip off the other ſhoots with your hands, obſerving carefully not to injure the plants you intend to remain for a crop. This being done, draw the earth with your ſpade about the two plants which are left, cloſing it faſt to each of them with your hands, and ſeparating them as far aſunder as they can conveniently be placed without breaking them. At the ſame time crop off the tops of the leaves that hang down with your hands. Then level the ground between the ſtocks, and the whole operation will be finiſhed.

The ſhoots which were ſtripped off will do to form freſh plantations of artichokes, where wanted, in the manner above deſcribed; for there is no other method of increaſing artichokes, than by planting the young ſhoots.

Plant Beans.

Beans of all kinds may be planted at this ſeaſon: let ſome be put into the ground once a fortnight, by which method the table will be conſtantly ſupplied with young beans during the ſeaſon. The white bloſſom bean, as it is a great bearer, will anſwer the purpoſe exceedingly well.

Let the larger ſorts of beans be planted in rows a yard aſunder; but two feet and a half will be ſufficient for the leſſer kinds.

Sow Peas.

All kinds of peas may be ſown any time this month; ſo that if you ſow a few every fortnight, or thereabouts, a conſtant ſupply will be the conſequence. Let drills be drawn for the different kinds of peas, according to the directions given in the foregoing month; ſow them regularly, and cover them with earth about an inch and a half deep.

Let the earth be drawn up to the ſtems of ſuch peas and beans as are now grown to ſome height; this will greatly ſtrengthen the plants, and encourage their growth.

Plant Kidney Beans.

About the latter end of the month, if the weather be mild and dry, and the ground not too wet, a few kidney-beans may be planted cloſe under ſome warm wall; but without that precaution they will not ſucceed.

In ſuch a warm ſituation let drills be drawn for them, about two feet, or two feet and a half aſunder. Plant the beans in the drills about two or three inches apart, and cover them with earth about an inch deep.

Plant Potatoes.

You may plant potatoes any time this month, but the ſooner you do it the better.

Be careful to procure roots perfectly ſound and of a tolerable ſize for planting. When a ſufficient quantity of theſe is procured, let them be prepared for planting by cutting or quartering them; that is, let each root be cut into two, three, or more pieces, carefully obſerving that each piece be furniſhed with one or two eyes.

When you have thus prepared your roots, let them be planted in rows about a foot and a half or two feet aſunder, and twelve or fifteen inches apart in the rows. They may be planted as you proceed in digging the ground, placing the roots in the trenches, and it would be of great advantage if a little dung were laid over every row of potatoes, and the earth thrown in upon the dung.

Mr. Miller obſerves that many of the roots cut in the above manner often rot, eſpecially if the weather ſhould prove wet, ſoon after they are planted; and therefore recommends the faireſt roots to be planted entire in the rows, inſtead of the ſeparate parts; and to allow them a larger ſpace of ground both between the rows and between the roots. By this method he aſſures us, that the roots will be in general large the following autumn.

It is the practice of ſome gardeners to dig holes about two feet and a half over, and eight inches deep, and to throw into each hole as much rotten dung as will half fill it, laying the dung higheſt in the middle, and then to place the potatoes upon the dung about half a foot aſunder, covering them ſix or ſeven inches deep with the earth that was thrown out of the holes. The holes muſt be at leaſt a yard every way aſunder. By this method fine crops of very large potatoes are procured.

Plant Jeruſalem Artichokes.

Theſe roots will thrive in almoſt any ſoil; but when they have once taken root, it will be difficult to clear the ground of them, for the leaſt bit will grow.

They may be planted any time this month, in rows two feet aſunder, and about fifteen inches apart in the rows.

Plant Mint.

New plantations of mint may be made this month, with little trouble.

It is propagated either by ſlips or parting the roots; but the former is generally practiſed. The method is this;

About the latter end of this month ſlip off and draw up with all their roots, a proper quantity of the beſt of the young plants, from ſuch old beds of mint as are well ſtocked with them. The beſt manner of doing this is to draw up the young plants gently with the help of your knife, ſeparating them carefully as they riſe from the old roots. If this be properly performed, every plant will riſe with tolerable good roots.

When a ſufficient quantity of theſe plants are procured, let them be ſet in rows ſix inches aſunder, and the ſame diſtance apart in the rows. As ſoon as they are planted, let a tolerable watering be given them to ſettle the earth about their roots.

If you intend to form a plantation of mint by roots, a ſufficient quantity of them muſt be procured, and parted in a proper manner. Then draw drills with a hoe ſix inches aſunder, place the roots about ſix inches apart in the drills, covering them with about an inch deep of earth, and rake the whole ſpot of ground. This method will ſucceed beſt if done the beginning of this month, or in October or November.

Plant Cives.

Cives may be planted any time this month, in the following manner: let a ſufficient quantity of ſlips from old roots be procured, and planted in beds about eight inches from one another.

Plant Garlic, Shallots, &c.

Both garlic and ſhallots may now be planted in the ſame manner as directed laſt month; but the ſooner it is done the better.

Plant Onions.

Such of the dry onions as begin to ſhoot in the houſe, may be now planted in a ſmall ſpot in the garden: they will ſerve to pull up for ſcallions.

Plant Roſemary, Rue, Southernwood, &c.

Any time this month you may plant the ſlips or cuttings of roſemary, rue, ſouthernwood, or lavender. A ſhady border ſhould be choſen for this purpoſe, and the ſlips or cuttings planted ſix inches apart. They will take root freely, if watered in dry weather. When they are well rooted, and have acquired a conſiderable degree of ſtrength, they may be tranſplanted into a more open ſituation.

If the plantation be made with cuttings, let theſe be taken from ſhoots produced the laſt year. They ſhould be from five or ſix to eight or nine inches long, and each cutting ſet about two thirds of its length into the earth.

But whenever you can procure ſlips, or ſuckers, that riſe immediately from the roots of older plants, theſe ſhould be choſen; becauſe they are often well furniſhed with roots.

Plant Sage, Hyſſop, Thyme, Penny-royal, &c.

The ſlips or cuttings of ſage, hyſſop, thyme, &c. may be planted any time this month.

Theſe cuttings ſhould be taken from the laſt year's ſhoots, and about five, ſix, or ſeven inches long; but as there are ſometimes ſlips, or ſuckers, ariſing from the bottoms of the old plants, theſe ſhould be choſen, eſpecially if they are furniſhed with roots.

Let theſe, whether cuttings or ſuckers, be planted in a ſhady border, where they will ſoon take root, and, in three or four months, become good plants, provided they are watered in dry weather. When they are well rooted, they may be taken up, and planted at proper diſtances, in beds of rich earth.

Sow Purſlane.

If purſlane be required early, it ſhould be ſown on a hot-bed the beginning of this month. Eighteen inches deep of dung will be ſufficient for this purpoſe: put the frame on, and cover the bed with earth five or ſix inches thick. Sow the ſeed on the ſurface, and cover it about a quarter of an inch with light earth.

About the end of the month, if the weather be warm, the ſeed may be ſown in a natural bed of rich earth.

Sow Parſley, Chervil, &c.

Parſley, chervil, and coriander ſeeds may be ſown any time this month. In order to which, let ſome ſhallow drills be drawn eight or nine inches aſunder, and in theſe the ſeeds ſown, each ſort ſeparate. Cover the ſeeds when ſown about half an inch deep with earth.

You may ſow parſley, in ſingle drills, at the edge of the quarters, or borders of the garden: it will make a uſeful, and, at the ſame time, a neat edging, if not ſuffered to grow too rank.

Sow Celery.

If you omitted to ſow celery laſt month, let it be ſown the beginning of this, for an early crop; more of the ſeed may be ſown about the middle, or latter end, of the month, for a principal crop. The ſeed ſown at the beginning of the month ſhould have a warm ſpot of rich earth. Let the ſeed be ſown on the ſurface, and either covered about a quarter of an inch with light earth, or raked in lightly with an even hand. Remember to ſprinkle the bed with water frequently in dry weather.

Sow Fennel, Dill, Savory, Hyſſop, Thyme, &c.

The ſeeds of fennel, dill, burnet, ſorrel, marygold, &c. ſhould be ſown the beginning of this month, if omitted in February.

With regard to hyſſop, thyme, ſavory, and ſweet-marjoram, they will ſucceed, if ſown any time this month.

All theſe ſeeds ſhould be ſown ſeparately, in ſpots of light earth, and raked in with an even hand.

Sow ſmall Salleting.

All kinds of ſmall ſalleting, ſuch as creſſes, muſtard, radiſh, rape, and turnep, ſhould be ſown, once a week, at leaſt, in a warm border. Let the ſeeds be ſown, each ſort ſeparate, in ſhallow drills, three inches aſunder, and covered lightly with earth.

Sow Capſicum.

The ſeeds of capſicum ſhould be ſown in a hot-bed, about the middle, or towards the latter end of the month; when the plants appear, let them have a large portion of free air, and frequent ſprinklings of water. When they are fit to remove, which will be about the latter end of May, they muſt be tranſplanted into beds of rich earth, in the common ground.

Sow

Sow Cardoons.

About the middle of this month you may ſow cardoons in a bed of light rich earth, in an open ſituation. The ſeed muſt be ſown thin, and the bed watered frequently in dry weather.

Sow Naſturtiums.

Naſturtiums require a dry ſoil, and open ſituation; in ſuch a ſpot therefore let drills about an inch deep, and two feet diſtance, be drawn. Let the ſeeds be placed in theſe drills about two or three inches apart, and covered with earth the depth of the drill. When the plants, which are of the climbing kind, riſe and begin to run, ſet ſticks, as you do for peas, to ſupport them.

Sow Hamburgh parſley.

The ſeeds of Hamburgh, or large-rooted parſley may now be ſown, if omitted the foregoing month. Let the ſeed be ſown thin, and equally, on beds of rich earth, in an open ſituation, and raked in with an even hand. When the plants are up, and have acquired a little ſtrength, they muſt be thinned to ſix inches diſtance, that the roots may have room to ſwell; for the root only of this plant is eaten.

Sow Scorzonera, Salſafy, and Skirrets.

The ſeeds of ſcorzonera, ſalſafy, and ſkirrets, may be ſown any time this month. But remember to ſow each ſort on ſeparate beds, in an open ſituation, and to rake the ſeed in lightly.

The NURSERY.

Sow the Seeds of hardy Exotics.

The ſeeds of many ſorts of hardy exotic trees and ſhrubs may be ſown this month; ſuch as the tulip-tree, larch-tree, and plane-tree; the ſaſſafras, arbor judæ, Virginia dogwood, American cypreſs, Virginia walnut, acacias, and many others of the like kind.

The method of ſowing the ſeeds of theſe hardy kinds, many ſorts of which will grow freely, and with very little trouble, is this:

Dig a ſpot for them where the ground is dry, of a looſe texture, and in a ſituation not too much expoſed. Let the earth be well broken, and the ſurface made very level.

When this is done, let the piece be divided into beds three feet and a half wide, and ſub-divided into as many parts as you intend to ſow different kinds of ſeed.

Let each ſeed be ſown, or planted, according to the kinds and ſizes of the different ſeeds, in its ſeparate ſpot.

Cover the ſeeds with fine light earth, taking care that each ſort, according to its ſize, be covered a proper depth; ſome half an inch, ſome an inch, and others an inch and a half, according to the ſize of the ſeeds, fruits, or nuts.

The beds muſt be frequently ſprinkled with water, in dry weather; and, when the ſun is hot, a little ſhading with mats will be of ſervice.

Sow the Seeds of the Cedar of Libanus, *Pines, Firs, and other hardy Ever-Green Trees and Shrubs.*

This is the proper ſeaſon for ſowing the ſeeds of the cedar of Libanus, pines, firs, cypreſs, juniper, and the like.

Let a ſmall ſpot of light earth be dug for theſe ſeeds, divided into ſmall beds, the ſeed ſown thereon, each ſort by itſelf, and covered with rich earth about half an inch thick.

You ſhould remember to water and ſhade your plants in hot dry weather, eſpecially while the plants are young, for then both will be of moſt ſervice.

This is alſo the ſeaſon for ſowing the ſeeds of the arbutus, or ſtrawberry-tree; but there will be more certainty of ſucceſs, if it be ſown on a hot-bed. The method is this.

Fill ſome ſmall pots with light freſh earth, ſow the ſeed therein, covering it about half an inch, and plunge the pots up to their rims in a hot-bed.

Sprinkle the ſurface of the earth in the pots frequently with water; and when the plants appear, give them a large quantity of freſh air.

Theſe ſeeds will indeed grow, if ſown in a bed of natural earth; but the growth of the plants will be much leſs in the ſame time, and the ſucceſs more uncertain.

You may now alſo ſow the acorns of ever-green oaks, the ſeeds of the phillyrea, bay, and other ever-greens.

All theſe ſeeds ſhould be ſown in light earth, the acorns covered about an inch deep, but the other ſeeds only half an inch.

Propagating Exotic Trees, &c. from Cuttings.

Exotic trees and ſhrubs may, at this ſeaſon, be propagated from cuttings. The method is this:

Dig a ſpot for them where the ground is ſomewhat moiſt and not ſtiff; break the earth well with the ſpade, and rake it ſmooth. This being done, divide the ſpot into as many parts as you have different ſorts of plants to propagate.

Let the cuttings be taken with a ſharp knife from the trees you intend to increaſe, and from the ſhoots of the laſt ſummer. They ſhould be from ſix to ten inches long, and planted in rows, each cutting being planted half way into the ground. Cloſe the earth well about them, water them in dry weather, and keep the whole ſpot clear from weeds.

Tranſplant Evergreens and Exotic Trees.

This is a proper ſeaſon for tranſplanting moſt kinds of ever-green trees and ſhrubs from the ſeed-beds, or other places where they ſtand too cloſe together; particularly the ever-green oak, phillyrea, alaturnus, pyracantha, lauriſtinus, Portugal laurel, arbutus, cytiſus, hollies and yews. Alſo cedars and cypreſſes, pines, firs, and junipers, may now be tranſplanted with ſafety.

Exotic trees or ſhrubs may alſo be removed at this ſeaſon.

Tranſplant Flowering Shrubs.

You may now remove moſt kinds of the hardy flowering ſhrubs.

But you ſhould remember to perform this operation in calm cloudy weather, when either the more tender kinds

or the ever-green plants, are to be removed; for upon this particular, and the expedition with which they are planted after they are taken up, the ſucceſs of the operation will, in a great meaſure, depend.

Be careful in planting them to break the earth perfectly fine, and ſee that it falls in properly between and about their roots.

As ſoon as they are planted, let them be well watered, and the waterings occaſionally repeated in dry weather.

You ſhould alſo cover the ſurface of the ground with mulch, or long litter, in order to prevent the ſun and wind from drying the earth too much about their roots. Let firm ſtakes be fixed in the ground, and the ſtems of thoſe plants which require ſupport, be faſtened to them.

Plant Vines.

This is a proper ſeaſon for propagating vines from cuttings.

The cuttings ſhould be taken from ſhoots of the laſt year's growth, ſhortened to ten or twelve inches; and, if poſſible, have an inch or two of the branch from whence the ſhoot was taken, at the extremity of each cutting.

Let the cuttings be planted in a ſlanting direction, and ſo deep that one eye only may be ſeen above the ſurface.

By this method moſt of the cuttings will ſucceed; they will take root freely, and even produce tolerable ſhoots the ſame ſeaſon.

Water them moderately in dry weather, and keep the ground perfectly free from weeds.

Let theſe cuttings be planted in the place were they are to remain; for they never ſucceed ſo well after tranſplanting.

Grafting.

Apples, pears, plumbs, cherries, &c. may be grafted any time this month.

You may cut off the ſtocks which are to be grafted for ſtandard-trees to what height you pleaſe.

The ſame method is to be purſued in performing the operation of grafting, as mentioned in the work of the nurſery laſt month.

Dreſs the Beds of Seedling Trees and Shrubs.

Look attentively over the ſeed-beds of young trees and ſhrubs; and where any weeds appear, let them be carefully picked out by the hand; for if they are ſuffered to continue, their roots will mix with thoſe of the young plants, and conſequently render it difficult to remove the one without injuring the other.

Water the Seed-Beds of young Trees and Shrubs.

You muſt remember to refreſh the ſeed-beds of young trees and ſhrubs with water now and then in dry weather; a little at a time will be ſufficient for the purpoſe. This will be of the utmoſt ſervice to them, as you will ſoon perceive by their growth.

The FRUIT-GARDEN.

Plant Fruit-Trees.

From the beginning to about the twentieth of this month, all kinds of fruit-trees may be planted with ſucceſs. And in moiſt ſoils there will be little danger of their growing, if planted at the latter end of the month; but the ſooner it is done the better.

The trees that are now planted will take root in a ſhort time; and, with the aſſiſtance of a little water in dry weather, ſhoot freely.

Obſerve the directions given in the former month with regard to the diſtances at which fruit-trees either for walls, eſpaliers, or ſtandards, ought to be planted.

Let a large hole be dug for each tree, and when carried to the depth intended, let the mould at the bottom be well looſened.

When the tree is ready for planting let all the ragged roots, and thoſe which are bruiſed, be cut off: and the ends of all the reſt be trimmed.

As ſoon as this is done, place the tree in the hole, break the earth well, and throw it in equally about the roots. When all is in tread the ſurface round the tree.

Remember to ſecure all new planted fruit-trees againſt the violence of the wind; ſtakes ſhould be fixed in the ground for the ſupport of ſtandard-trees, and thoſe planted againſt walls or eſpaliers be faſtened thereto.

Plant Fig-Trees.

This is a very proper ſeaſon for planting fig-trees; for they will now take root in a very ſhort time.

It is neceſſary to obſerve, that fig-trees are propagated either from layers, or ſuckers ariſing from the roots of old trees.

When therefore it is intended to plant thoſe trees, let a ſufficient number of good ſuckers of a moderate growth, and ſuch as are firm or well ripened, be procured at the beginning of this month, and planted where they are to remain.

But fig-trees raiſed from layers made from the branches, are preferable to thoſe from ſuckers; becauſe the latter are more apt to run to wood than the former. The time for laying down the branches in order to raiſe young trees, is either in this month or in October or November: but remember to cover them with long littter in hard froſts. In one year's time the layers will be ſufficiently rooted, when they ſhould be ſeparated from the old ſtock, and planted where they are to remain.

Remember to make your layers from branches of fruitful trees, for thoſe which are made from the ſuckers, or ſhoots produced from old ſtools, have very ſoft branches, full of ſap, and therefore are in danger of ſuffering from the froſt. They will alſo run greatly into wood, and not be very fruitful. Let the ſhoots therefore that are laid down be woody, compact, and well ripened; not young ſhoots full of ſap, and whoſe veſſels are conſequently large and open.

If fig trees are to be planted againſt walls, or pales, they ſhould not be ſet nearer to each other than twenty-feet.

Pruning Fig-Trees.

This is the beſt ſeaſon of the year for pruning fig-trees; for if they are pruned at the latter end of autumn, as is often practiſed, many of the young bearing ſhoots, which are tender, are very liable to be killed by the ſevere froſts; but if the pruning be omitted till this month, when the froſts are over, there is great reaſon to hope, that though ſome of the bearing branches may have periſhed by the ſeverity of the weather, enough

enough of them will have eſcaped the froſt, to furniſh the wall.

Obſerve in pruning fig-trees, to leave a ſufficient ſupply of the laſt ſummer's wood, from the bottom to the extremity, every way, and in every part where there is proper room to train the ſhoots, ſo that the tree may be equally furniſhed with them at moderate diſtances; for theſe bear the figs the enſuing ſeaſon.

Remember to train in every year ſome young ſhoots at or near the bottom, that there may be a proper ſupply of young branches, coming out regularly one after another, to ſupply the places of old naked branches, which will appear every ſeaſon, in ſome part or other of the tree. At the ſame time let all the old branches which are deſtitute of young wood be cut out; by which means there will be ſufficient room to train the bearing branches neatly and at proper diſtances; for they ſhould neither be left, nor laid in too cloſe.

You muſt never ſhorten, or top, the young branches of fig-trees; they muſt be left at full length; for by ſhortening the branches you will not only cut away the part where the fruit would otherwiſe have appeared, but alſo occaſion the branches to run greatly to wood, and never produce half a crop of fruit.

Obſerve to nail every branch ſtrait and cloſe to the wall, and at about ſeven or eight inches from one another.

Prune Apricot, Peach, and Nectarine-Trees.

All the apricot, peach, and nectarine-trees that were not pruned laſt month, muſt be now pruned and nailed, and the ſooner the better; for the whole muſt be finiſhed before the middle of the month.

The greateſt care ſhould now be taken in pruning and eſpecially in the nailing of theſe trees; becauſe as the buds are now conſiderably ſwelled for bloom, the leaſt touch will rub them off.

The ſame method is to be obſerved in pruning trees now as in the former months.

Guard the Apricot, Peach, and Nectarine-Trees from Froſt.

You ſhould be careful to defend the choiceſt kinds of your apricot, peach, and nectarine-trees, when in bloſſom, from froſts, which often happen at this time of the year.

In order to this, mats, of the larger kind, ſhould be nailed from one end of the wall to the other, letting them hang down over the trees. The lower ends of the mats ſhould alſo be faſtened down, to prevent their being blown to and fro by the wind, which would inevitably beat off many of the bloſſoms.

But whenever the weather is mild, the mats ſhould be taken away; for the bloſſoms require this kind of ſhelter in ſharp froſts only.

Prune Cherries, Plums, Apples, Pears, &c.

You muſt now forward the pruning of cherries, plums, apples, pears, and all other kinds of fruit-trees, whether ſtandards or planted againſt walls or eſpaliers, which could not be pruned in the foregoing month, with all the diſpatch poſſible: let the whole be finiſhed by the middle of the month at fartheſt.

Pruning and ordering young Apricot, Peach and Nectarine Trees.

This is the proper ſeaſon for heading down young apricot, peach, and nectarine-trees, which have been planted ſince Michaelmas laſt, with their firſt ſhoots from budding at full length.

This operation ſhould be performed juſt as the trees begin to puſh; you will therefore do well to watch the proper opportunity, and let their heads be then ſhortened; for this will prove of the utmoſt advantage to the young trees.

The head ſhould be cut down to the third or fourth eye from the bottom; and if there are two ſhoots from the ſame ſtock, let both be ſhortened in the above manner.

By this method the trees will produce ſome ſtrong ſhoots near the ground, which will enable you to furniſh equally every part of the wall with branches.

On the contrary, by omitting to head the trees, they would run up with a head like a ſtandard-tree, and hardly furniſh a ſingle branch within two or three feet of the ground; and, conſequently, that part of the wall would be rendered wholly uſeleſs.

With regard to thoſe young apricot-trees that were headed a year ago, and each produced three or four ſhoots the laſt ſummer, you ſhould now ſhorten theſe ſhoots to ſuch lengths as may encourage each ſhoot to produce two or three new ones the ſame ſeaſon.

Let each ſhoot be ſhortened to about one half of its original length; that is, ſuch as are twenty inches long ſhould be about ten or eleven inches; and ſuch as are fifteen inches, or thereabouts, in length, ſhould be ſhortened to eight or nine; and ſo in proportion to the different lengths of the ſhoots.

Prune young Apple, Pear, Plum, and Cherry-Trees.

Let the heads of young dwarf-apple, pear, plum, and cherry-trees, lately planted againſt walls or eſpaliers, be now pruned down, in order to induce them to put out ſome good ſhoots, near the ground, to furniſh that part of the wall or eſpalier.

If the heads of theſe trees are only of one year's growth from the bud or graft, let them be ſhortened to three or four eyes, obſerving what was mentioned before, namely, to do it juſt when the buds begin to break.

If they are two years from the bud or graft, and the firſt ſhoots were, laſt ſpring, cut down as above; let the ſhoots which were produced from them laſt ſummer, be now alſo ſhortened to ſix or ſeven inches.

You muſt obſerve the ſame rule with regard to theſe trees, as mentioned above for the apricot and peaches; for it is by a judicious ſhortening the firſt and ſecond year's ſhoots from the budding and grafting, that the whole ſucceſs depends with regard to the forming at once a uſeful and a beautiful tree.

When a young wall or eſpalier tree is once well furniſhed with branches near the ground, theſe will eaſily ſupply you with more in their turn, to cover the wall or eſpalier upwards.

But in the common courſe of pruning apple, pear, plum and cherry-trees, their ſhoots or branches ſhould not be ſhortened; for after the young trees are furniſhed with a proper ſupply of branches at the bottom, their ſhoots muſt then be trained to the wall at length,

ſhortening only a particular ſhoot at places where more wood may be required to cover the part.

Prune and dreſs Gooſeberries and Currants.

If there be any of your gooſeberry or currant-buſhes yet remaining unpruned, let the work be done at the beginning of the month.

Remember to keep the branches thin, and the middle of the tree open and clear of wood, ſo as to admit the ſun and air freely; for by that means the fruit will be larger and much finer taſted.

At the ſame time let the ground be dug between the gooſeberry and currant-trees, where it has been omitted in the former months. For the looſening of the ground about theſe ſhrubs is of the utmoſt advantage to them, and at no time more uſeful than at preſent, when they are juſt beginning to ſhoot.

Prune and dreſs Raſpberries.

Let all the pruning of raſpberries be now finiſhed; obſerving to cut out all the dead wood; and where the live wood ſtands too thick, let part of it be taken away, as mentioned in the former month, ſhortening at the ſame time the ſhoots that are leſt.

Remember alſo to dig the ground between the rows of raſpberries, where it was not done before; for this will at once ſtrengthen the ſhoots, and give the bed a clean and neat appearance.

You may ſtill make plantations of raſpberries, provided the whole be finiſhed by the middle of the month.

The plants will take root ſoon after they are ſet, and grow freely, provided they are now and then refreſhed with water in dry weather.

Remember in planting raſpberries to make uſe of the young ſhoots produced from the old roots laſt year; chooſing thoſe whoſe roots are well furniſhed with fibres, and rejecting thoſe whoſe extremities are naked and ſticky. The inſtructions for planting theſe ſhoots given in the former month, will be ſufficient for the purpoſe, and therefore need not be repeated.

Dreſs Fruit-Tree Borders.

Let all the fruit-tree borders be dug at the beginning of the month, if it was not done the preceding. This will be of great ſervice to the trees, deſtroy the weeds, and give the borders when raked, a neat and pleaſing appearance.

At the ſame time the borders which were dug the preceding month, ſhould be ſtirred with a hoe, and then raked very ſmooth. This will greatly retard the growth of the young weeds, and make the whole appear neat and decent.

Dreſs Strawberries.

If any of your ſtrawberry beds ſtill remain undreſſed, let the work be done as faſt as poſſible; for the plants will now begin to puſh apace.

Clear the beds from weeds, and the plants from ſtrings and other litter; at the ſame time let ſome of the plants be taken away, wherever they are found to ſtand too thick.

The beſt method of keeping theſe plants is in ſingle trenches as it were, ſeparate from one another, ſo that there may be room to dig round them with a narrow ſpade or a trowel.

As ſoon as you have cleared the beds from litter, looſen the earth between the plants; and if you add a little freſh earth to the beds it will ſtrengthen the plants, ſo that they will flower much ſtronger, and produce larger fruit.

Plant Vines.

Cuttings of vines may be planted any time this month; they will take root freely.

Let the cuttings be planted ſomewhat ſlanting, and ſo deep that one eye only may be above the ground, and that cloſe to the ſurface. And be ſure to plant them where they are to remain.

The cuttings muſt be ſhoots of the laſt year, and ſhortened to about twelve inches in length; and let each cutting have about an inch of the preceding year's wood at the bottom.

Prune Vines.

If any of your vines ſtill remain unpruned, let it be done as ſoon as poſſible at the beginning of the month; for thoſe vines that are pruned too late ſeldom produce a good crop of grapes.

The PLEASURE or FLOWER-GARDEN.

Sow tender Annual Flowers.

About the beginning of this month a hot-bed ſhould be made for ſowing tender annual flowers, provided that work was not done in February. They ſhould be made entirely in the ſame manner as directed in the foregoing month; and the ſame kind of ſeeds ſhould be ſown. By good management the plants raiſed at this ſeaſon may be brought to flower ſtrongly and beautifully in July.

Tranſplant tender Annual Flowers.

Let a hot-bed be made about the middle or latter end of this month, in order to prick the tender annual flowers that were ſown in February. Let the bed be about three feet high, and the ſurface even; then ſet on the frame; and when the great heat is over, let it be covered with light, rich, and perfectly dry earth, ſix inches thick.

As ſoon as you perceive the earth is warm, prick the plants therein at three or four inches each way, and give them a gentle ſprinkling of water. Put on the glaſſes, but remember to raiſe them a little every day to let the ſteam eſcape; and ſhade the plants from the ſun till they have taken root.

When the plants have taken root, and begin to puſh, let the glaſſes be raiſed a conſiderable height every day, that they may have a ſufficient quantity of freſh air; and, at the ſame time, remember to give them frequently a gentle ſprinkling of water.

Sow the hardier Kinds of Annual Flowers.

In the beginning of this month, a hot-bed ſhould be made for ſowing the ſeeds of the hardier kinds of annual flowers.

The bed ſhould be two feet high, made in the uſual manner, and covered with rich earth four or five inches thick.

On this bed you may ſow the ſeeds of China aſter, Indian pink, marvel of Peru, balſam, palma Chriſti, capſicum, mignonette, French and African marygolds, ten-

ten-week ſtocks, chryſanthemum, tree and purple amaranthus, perſicarias, love-apple, ſcabiouſes, convolvulus major, ſtramoniums, and ſeveral others of the like ſorts.

Let the ſeeds be ſown each ſort ſeparate, in ſhallow drills, drawn from the back to the front of the frame, two or three inches aſunder. Cover the ſmaller ſeeds about a quarter, and the larger half an inch. When the plants are come up let them have air by raiſing the glaſſes a conſiderable height every day; and as ſoon as they have gathered a little ſtrength, they muſt be gradually hardened to bear the open air, by taking the lights entirely off every mild day. Remember to refreſh them often with moderate ſprinklings of water. About the middle of next month ſome of them will be fit to prick out, and the remainder in May.

It ſometimes happens that dung cannot be ſpared at this ſeaſon for making a hot-bed: when this is the caſe, the above annual flower ſeeds may be ſown in a warm border, where the earth is rich and light; and if the weather be warm, they will ſucceed extremely well; particularly China aſter, ten-week ſtock, Indian pink, African and French marygolds, chryſanthemum, purple and tree amaranthus, perſicarias, ſcabiouſes, and convolvulus major. Let the ſeeds be ſown thin, each ſort ſeparate, the beds arched over with hoops, and covered with mats every night in bad weather.

By obſerving this management the plants will grow freely, and, if you refreſh them with water in dry weather, they will be fit to plant out in May, or the beginning of June, and flower pretty ſtrongly in autumn.

Sow hardy Annual Flowers.

About the middle of the month you may ſow in the borders, and other parts of the garden, the ſeeds of all ſorts of hardy annual flowers: particularly the large and dwarf annual ſun-flower, oriental mallow, lavatera, larkſpur, flos Adonis, ſweet ſultan, large fleſh-coloured blue, and yellow lupins, convolvulus major, ſweet-ſcented and Tangier peas, and naſturtium. Soon after you may ſow the ſeeds of the Spaniſh nigella, purple and white Candia tuft, Venus looking-laſs, Venus navel-wort, dwarf double poppy, Lobel's-catchfly, dwarf annual lychnis, convolvulus minor, and ſome others.

You ſhould remember in ſowing the above, or any other kinds of annual flower ſeeds, to ſow each ſort ſeparate in patches, in the different borders, in the manner mentioned in February. The plants muſt remain to flower in the places were they are ſown, for they do not ſucceed well after tranſplantation; let them therefore be thinned, where they have riſen too thick. At the ſame time remember to water the ſeeds in dry weather, and alſo the plants after they are come up.

Dreſs the Pots of Annual Flowers.

Clear the plants of the double wall flowers, double ſtock july-flowers, double ſweet-williams, rockets, roſe campions, catchfly, campanulas, ſcarlet lychnis, &c. that were potted laſt autumn, from decayed leaves. Then take ſome of the earth out of the pots, but do not go ſo deep as to diſplace the roots of the plants. Fill up the pots again with freſh earth, and give them ſome water. By this means their roots will be ſtrengthened, the plants will grow freely, and produce large and beautiful flowers.

Tranſplant Chryſanthemums.

The cuttings of the double chryſanthemums planted in pots or boxes laſt autumn, ſhould now be removed into ſingle pots, where they are to flower. At the beginning of next month, ſome of them may be planted out in the borders among other flowers, where they will blow ſtrong, and make a handſome appearance.

Nurſe Auricula Plants.

You ſhould be very careful to defend your choice auricula plants from too much wet, cold, winds, and froſt; for either will greatly injure their flower-buds, which are now in great forwardneſs. The pots ſhould therefore be continued under the hoop-arches, where the plants may enjoy the benefit of the open air, and when there is occaſion, be ſufficiently defended by drawing the mats over the hoops.

But, at the ſame time, remember not to debar the plants from a warm and moderate ſhower of rain now and then, if any ſhould happen, for ſuch ſhowers will be of the greateſt ſervice to the plants. Remember alſo to refreſh them often in dry weather with moderate ſprinklings of water, juſt enough to keep the earth about their roots a little moiſt.

Tranſplant and dreſs Carnations.

You muſt tranſplant all the carnations which were omitted laſt month, at the beginning of this.

Remember to take up the plants with a ball of their own earth about their roots, and place each plant in the middle of each pot, unleſs the pots be large, in which caſe two plants may be ſet in each pot; obſerving to cloſe the earth well about them, and give them a moderate watering to ſettle the earth well about their roots. Let the pots be ſet in ſome proper place where the plants may be defended from cold winds, and let them have moderate waterings frequently in dry weather.

At the ſame time the carnation plants which were removed laſt autumn into the pots where they are to remain, ſhould now have freſh earth given them, by removing the old earth from the tops of the pots, and filling them up with freſh.

In order to this, let the plants be firſt cleared from all dead leaves, then take out as much earth as poſſible out of the pots, without diſturbing the roots of the plants, and fill the pots with freſh mould, laying it cloſe round the plants: after which let them be moderately watered to ſettle the earth. By this means the plants will be ſo greatly ſtrengthened, that they will ſhoot ſtrongly, and produce large and beautiful flowers.

Protect your Tulip, Hyacinth, and Ranunculus Beds.

The more curious kinds of tulips, hyacinths, ranunculuſes, and anemonies, muſt be protected from the froſts and cold rains, which frequently happen this month, and which will greatly injure your plants, if they are not well guarded; for their flower-buds are now advancing apace. Let therefore the hoop arches be ſtill continued over the beds, and mats drawn over the hoops every night in heavy rains and froſty weather. By this precaution your flowers will blow large and in great perfection.

But remember to take away the mats when the weather is mild, that the plants may enjoy the benefit of the

the freſh air; nor ſhould they be covered in a moderate ſhower of rain, for that will be of great ſervice.

It will not be amiſs, if your beds were at firſt covered with low hoops, to remove them, and place taller in their ſtead, as this will give the plants more air when the mats are drawn over the hoops, and there will be leſs danger of injuring the beds in drawing the mats over the hoops.

Support Hyacinths.

You muſt now be careful to ſupport with ſticks the flower-ſtems of your large double hyacinths, for they now begin to grow apace, and the flowers are too heavy to be ſupported by the ſtock alone. Remember to uſe ſome ſoft tying in faſtening the flower ſtalks to the ſticks, which muſt be fixed in the ground very near the plant.

Sow Perennial Flower Seeds.

Moſt kinds of perennial flower ſeeds may be ſown this month, particularly carnations, pinks, ſweet-williams, wall-flowers, and all the ſpecies of ſtock july-flowers. You may alſo ſow ſingle roſe campion, catchfly, ſcarlet lychnis, columbines, Greek valerian, ſcabiouſes, and Canterbury-bells.

Sow French Honeyſuckles, Hollyhocks, &c.

The ſeeds of French honeyſuckles, hollyhocks, tree primroſe, campanulas, fox-gloves, and many other ſorts, may be ſown this month. A ſpot of ground in a warm ſituation, but not too cloſe to the walls or fences, ſhould be dug for the above flower-ſeeds. Let the ſpot, when dug, be divided into beds of three feet and a half wide, and ſubdivided into as many parts as you intend to ſow different kinds of ſeed, for each kind muſt be ſown ſeparate. Let the ſeeds be ſown thin and covered properly with earth, the larger about half an inch, and the ſmaller about a quarter of an inch deep.

Some gardeners ſow all kinds of perennial flower ſeeds in ſhallow drills, proportioning the depth of each drill to the particular ſort of each ſeed, ſo that they may be covered with their proper depth of earth. Others, after raking the ſurface of the bed ſmooth, draw off equally, with the back of the rake, about a quarter of an inch deep of earth, into the alleys: when this is done they ſow the ſeed, and with the teeth of the rake cover them with the earth before drawn into the alleys. Either of theſe methods may be practiſed with ſucceſs; perhaps the drills are more proper for the larger kinds of ſeed, and the broad caſt for the ſmaller.

But whatever method be uſed in ſowing the ſeeds, you muſt remember to ſprinkle the beds frequently with water in dry weather. Your plants will be fit to prick out in May or June.

Plant Ranunculuſes, Anemonies, &c.

You may now plant ſome ranunculuſes and anemonies: they will blow and make a fine appearance in May and June, when the early ſorts are over. But remember to water the plants frequently after they are up, in dry weather, and then they will flower tolerably ſtrong.

Plant Carnations, Pinks, &c.

This is the ſeaſon for planting in clumps, in the borders, carnations, pinks, ſweet-williams, both double and ſingle; batchelors buttons, double feverfew, golden rod, perennial ſun-flowers, perennial aſters, French honeyſuckles, columbines, Canterbury-bells, monks-hood, fox-gloves, tree-primroſe, and various other ſorts of the ſame tribe.

All the above plants will take root in a very ſhort time, and flower this ſeaſon, provided they are now and then refreſhed with water in dry weather.

The fibrous rooted plants may alſo now be planted in the borders at the beginning of this month; ſuch as polyanthuſes, auriculas, double camomile, London-pride, violets, hepaticas, thrift, primroſes, gentianella, and a great variety of others of the ſame kind. Give them a little water when firſt planted, and repeat it at times in dry weather: they will grow freely, and make a fine appearance in bloſſom.

Plant Flowering Shrubs.

In any part of the garden, where flowering-ſhrubs are wanted, they may now be planted; for moſt ſorts will ſucceed: particularly the althæa-frutex, ſpireas, ſyringas, golden-rods, and honey-ſuckles.

Tranſplant Exotic Trees.

The greater part of the hardy exotic flowering-trees or ſhrubs may be tranſplanted any time this month.

Tranſplant Evergreens.

This is a very good ſeaſon for tranſplanting evergreens; for they will take root ſooner now than at any other time of the year: particularly the arbutus, or ſtrawberry-tree, magnolias, bays, pyracanthas, phillyrea, alaturnus, laurel, Portugal laurel, lauriſtinus, evergreen oak, hollies, yews, and a great variety of others.

You may alſo tranſplant pines and firs of all ſorts, cedars of Libanus, cypreſs, junipers, and others of that kind.

Remember in planting evergreens, and indeed ſhrubs of every kind, to let the work be done as expeditious as poſſible, after they are taken up. Let a hole be opened for each ſhrub, large enough to receive the root freely; and when it is deep enough, let the ground be well looſened at the bottom. As ſoon as the holes are ready, bring the ſhrubs, and having pruned away the broken or bruiſed roots, place them upright in the hole, break the earth well, and throw it in equally about their roots, and cover them of a proper depth. Let the ſurface of the earth round each ſhrub be made hollow like a baſon, to hold the water when given in dry weather; and let ſome mulch or long litter be laid upon the earth round the tree; this will keep the ground moiſt about the roots.

Let each ſhrub be well watered as ſoon as planted, in order to ſettle the earth about the roots; and, at the ſame time, let ſtakes be fixed in the earth, and ſuch as require ſupport be faſtened thereto.

Be careful to plant your ſhrubs, of whatever kind, at proper diſtances, that when they grow up, they may not crowd one another: for ſhrubs always ſhow themſelves to moſt advantage when they are ſeparate. In a word, there muſt always be room ſufficient left to dig, and hoe and clean the ground between them.

Plant Box Edgings.

Box planted at this ſeaſon, will ſoon take root and flouriſh, provided it be properly watered. Where therefore

fore any gaps appear in edgings formerly planted, they ſhould be now filled up; for nothing has a worſe appearance than ragged and uneven edgings.

If you like thrift better than box for edgings to borders or flower-beds, it may be planted at the beginning of this month; and it will ſucceed, if watered at proper intervals in dry weather, till it has taken root.

Dig the Borders.

The borders and other parts of the garden that have not already been dug, muſt now be done. Let them alſo be raked ſmooth, which will at once give them a neat appearance, and put them in a proper condition for receiving the ſeeds of annual flowers.

Hoe and rake the Borders.

Thoſe borders which were dug and planted with flowers laſt autumn, muſt have their ſurface looſened with a ſmall hoe, and the earth ſtirred carefully between the plants, taking care of the tender ſhoots of bulbous plants, which are now juſt breaking through the ſurface. A dry day ſhould be choſen for this work, and, as ſoon as the earth is looſened with the hoe, let it be neatly raked, clearing away all the rubbiſh, weeds, and decayed leaves which appear about any of the plants.

This will greatly promote the growth of the flowers, and at the ſame time prevent the firſt growth of ſeed-weeds.

Dig the Clumps in Shrubberies.

Let the ground between the flowering-ſhrubs and evergreens in the clumps and borders, be dug at the beginning of this month, if it was not done the preceding. This will greatly help the plants, and the freſhneſs of the ground will give them an additional beauty.

Gravel Walks.

You muſt now be very careful to keep your gravel walks free from weeds, and all kinds of litter.

If you intend to make any new gravel walks, this is a very proper ſeaſon for doing it.

In order to this, you ſhould chuſe that ſort of gravel which conſiſts of ſmooth even pebbles, mixed with a due quantity of loam; for this will bind exceeding cloſe, and look very beautiful.

But if the only gravel you can procure be looſe or ſandy, you ſhould take one load of ſtrong loam to two or three of gravel, caſt them well together, and turn this mixture over two or three times, that they may be well blended together; if this be mixed in proper proportion it will bind well, and not ſtick to the feet in wet weather.

There are different opinions with regard to the choice of gravel; ſome are for having the gravel as white as poſſible, and in order to make the walks more ſo, they roll them with ſtone rollers, which are often hewn by the maſons, that they may add a whiteneſs to the walks. But this renders it very troubleſome to the eyes, by reflecting the rays of light too ſtrongly. This ſhould therefore be avoided, and ſuch gravel as will be ſmooth, and reflect the leaſt, ſhould be preferred.

With regard to the depth of gravel walks, ſix or eight inches may do well enough; a foot thickneſs will be ſufficient for any; but there ſhould always be a depth of rubbiſh laid under the gravel, eſpecially if the ground be wet; in which caſe there cannot be too much care taken to fill the bottom of the walks with large ſtones, flints, brick rubbiſh, chalk, or any other materials that can eaſily be procured, which will drain off the moiſture from the gravel, and prevent its being poachy in wet weather. If theſe materials cannot be procured to lay at the bottom of the walks, let a bed of heath, or furze, be laid under the gravel to keep it dry. If either heath or furze be laid in green, they will continue a long time, as they will be covered from the air. This bed will prevent the gravel from getting down into the clay, and alſo keep it dry. If theſe precautions are omitted in the firſt laying of gravel upon clay, the water detained by the clay will render the gravel poachy, whenever there is much rain.

Gravel walks are apt to be laid too round, which gives them a narrow appearance, and, at the ſame time, renders them not ſo well to walk upon. A gravel walk of twelve feet wide ſhould have a riſe of about three inches and a half in the middle; that is, the middle ſhould riſe gradually ſo much higher than the ſides.

The ſame proportion ſhould be allowed to every gravel walk; one of twenty-four feet wide ſhould not have above five inches riſe in the middle, and one of ſix feet wide not more than one inch and a quarter; and ſo in proportion for any other breadth.

You muſt alſo, in making gravel walks, have great regard to the level of the ground, ſo as to lay the walks with eaſy deſcents towards the low parts of the ground, that the wet may be drained off eaſily; for when this is omitted, the water will lie upon the walks a conſiderable time after hard rains, which will render them unfit for uſe, eſpecially where the ground is naturally wet or ſtrong: but where the ground is level, and there are no declivities to carry off the water, it will be proper to have ſink-ſtones laid by the ſides of the walks, at convenient diſtances, to carry off the wet; and where the ground is ſo naturally dry, that the water will ſoon ſoak away, the drains, from the ſink-ſtones, may be contrived ſo as to convey the water into ceſſpools, where it will gradually ſink away; but, in wet land, there ſhould be ſubterraneous drains to convey the water off, either into ponds, ditches, or ſome other place proper to receive it; for where this is not well provided for, the walks can never be either handſome or uſeful.

In order to deſtroy worms, that too often ſpoil the beauty of gravel walks, ſome recommend the watering them well with a ſtrong and bitter infuſion of walnut-tree leaves, eſpecially thoſe parts of the walks moſt annoyed with theſe reptiles. This bitter infuſion will, it is ſaid, as ſoon as it reaches them, force them out on the ſurface, ſo that they may be eaſily gathered up, and taken away. But if, in the firſt laying of the walks, a good bed of lime rubbiſh be placed in the bottom, there will be no need of having recourſe to bitter infuſions; for no worms will ever harbour near lime.

With regard to old gravel walks, you muſt now remember to roll them twice a week, at leaſt, when the weather will permit, by which means they will be firm, and the ſurface ſmooth. They will alſo appear very beautiful, and be agreeable to walk upon.

But where the ſurface is dirty, or over run with weeds or moſs, they muſt be turned; by which means the moſs and weeds will be deſtroyed, and the walks will appear freſh as when firſt made.

Such

Such gravel walks as were broken up, and laid in ridges, at the beginning of winter, ſhould now be levelled down, and put into their proper form.

But ſurely this ridging of gravel-walks, in winter, is one of the moſt unneceſſary, and, at the ſame time, the moſt ill-looking contrivances that was ever introduced into a garden. For the walks are thereby rendered entirely uſeleſs, in the winter ſeaſon; nay, even in ſome gardens, rendered incommodious both to the proprietor and the gardener himſelf; and, in all gardens, has a deſolate and confuſed appearance. Nor can any good reaſon be given for this abſurd practice; for it will not prevent the growth of weeds, as pretended, and, at the ſame time, will at once, both deaden the colour, and deſtroy the binding quality of the gravel.

However, where this has been practiſed, let the ridges be levelled down ſome time this month.

In turning gravel walks, remember to tread, rake, and roll them every twenty feet at leaſt. The method is this:

When you have advanced with the turning about twenty feet from the end, let that be trodden all over equally; then ſmooth it off with the back of the rake, and roll it directly. In this manner you are to proceed to the end of the walk; for gravel never binds ſo well as when freſh ſtirred.

Clean Graſs Walks.

Let your graſs walks and lawns be kept perfectly clear of worm-caſts, for theſe ſpoil the graſs, and have an unſightly appearance.

Where-ever, therefore, any of them appear, let them be broken, and ſpread about with a taper and pliable pole, and the graſs be immediately rolled with a wooden roller; by which means the earth thrown up by the worms will be taken away, and you may mow the graſs cloſe and even.

If the weather be mild, the graſs will now begin to grow apace; let therefore your walks, or lawns, be mowed in good time, before the graſs is rank, otherwiſe you will not be able to cut it cloſe enough, to procure a fine and even bottom.

At the ſame time, let all the edges of the walks, or lawns, be neatly cut with a ſharped-edged iron; this will give them a very pleaſing and neat appearance.

Lay Turf.

Any time this month you may make new graſs walks or lawns, for the turf will now grow freely, provided it be laid down as ſoon as it is cut.

Remember to beat it well after it is laid, and to roll it ſufficiently after rain; for by this means the ſurface will be rendered firm and ſmooth.

APRIL.

Work to be done in the KITCHEN-GARDEN in April.

Cucumbers and Melons.

BE careful to examine the heat of your cucumber beds; for if that be deficient, you muſt not epect either a plentiful crop, or fine fruit.

If therefore you pereeive the heat of the beds to be faint, let no time be loſt in renewing it, by adding a lining of horſe dung to the ſides of the bed, as directed in the former month. By this addition the heat will be revived, the plants preſerved in a growing ſtate, the fruit will ſet freely, ſwell kindly, and grow to a handſome ſize.

But, at the ſame time, remember to give the plants air every day, by raiſing the ends of the lights at the back part of the frame with props, higher or lower, in proportion to the ſtate of the weather.

A little before ſun-ſet, let mats be thrown over the glaſſes, and removed every morning about an hour after the ſun is up.

Let moderate quantities of water be given the plants occaſionally; the cucumber plants will require it more frequently than the melon; but be ſure not to give them too much at one time.

The melons will alſo require water; but as their fruit will now begin to appear, it muſt be applied very moderately.

Whenever you perceive any decayed or damaged leaves on any part of the plants, whether cucumbers or melons, let them be taken away together with all the decayed flowers.

When the weather is hot, and the beams of the ſun fierce, ſo that you perceive the leaves of the cucumbers or melons to flag, you ſhould be careful to ſhade them either with a mat, or looſe hay thrown over the glaſſes, for two or three hours, while the heat continues.

Make Ridges for Cucumbers and Melons.

About the middle or latter end of this month, according to the warmth of the ſeaſon, you muſt make ridges for ſuch cucumber and melon plants as are to be planted under hand or bell-glaſſes. Theſe ridges are made in the following manner:

Dig a trench about three feet wide, and, if the ſoil be dry, ten inches deep, but if wet, not above three inches, levelling the earth at the bottom of the trench. Then put in your dung, prepared as directed in the preceding months for making hot beds. The dung ſhould be at leaſt two feet thick. If you propoſe to make more than one ridge, the interval between the ridges ſhould be four feet; and theſe ſpaces, or alleys, are, in about a month or five weeks, to be filled with new hot dung, and covered with earth; for this will revive the heat in the ridges, and give freſh vigour to the plants.

When this is done, and the dung in the ridge has a proper degree of heat, cover it with earth about four inches thick round the ſides, raiſing hillocks in the middle of the ridge, three feet and a half aſunder. Set the glaſſes upon the hills, leaving them cloſe down about twenty-four hours, in which time the earth in the hills will be ſufficiently warmed.

Stir up the earth of the hillock with your hand, and make it a little hollow in the middle, in the form of a baſon; in each of which let three or four cucumber, or

or two melon plants be set, observing to shade them until they have taken root; after which, you must be careful to give them air, by raising the glasses on the opposite side to the wind, in proportion to the heat of the weather: but remember that this is to be done only about the middle of the day, till they are able to bear the sun without flagging, when they should enjoy both freely.

Remember to cover the glasses every night with mats, till the latter end of May.

If your plants have not been stopped before, remember to do it now. This operation should be performed when they have two, three, or four leaves, by pinching off the top of the plant; by which means each plant will produce two, three, or four shoots, or runners: and when these runners have three joints, it will be proper to stop them also, by pinching off the top of each at the third joint, which will cause each of these runners to put out two, three, or more shoots. By this means, the plants will be furnished with fruitful runners; for it is from these lateral shoots we are to expect the fruit; but if the plants were not to be stopped as above directed, there would not be above one or two runners from each plant, and these perhaps extend a yard in length without shewing a single fruit, especially the cucumber.

When the fruit appears upon the plant, there will also appear many male flowers on different parts: these may at first sight be distinguished; for the female flowers have the young fruit situated under them; whereas the male have none; but have three stamina in their center, loaded with a golden powder, intended to impregnate the female flowers; and when the plants are exposed to the open air, the soft breezes of wind convey this farina, or male powder, from the male to the female flowers. Under frames the case is different: the breezes of air are wanting to convey the farina from the male to the female flowers; and for want of this, many of the fruit drop off, because the flowers were not impregnated. The curious have often observed, that the bees which have crept into the frames when the glasses have been raised to admit the air, have supplied the want of these gentle breezes of wind, by carrying on their hind legs the farina of the male into the female flowers, and left there a sufficient quantity of it to impregnate them. These industrious insects have taught the gardeners a method of supplying the want of a free circulation of air under the frames, so necessary to the impregnation of the female flowers. The method is this:

They carefully gather the male flowers at a time when this farina is fully formed, and carry it to the female flowers, turning them down over them, and gently striking, with the nail of one of their fingers, the outside of the male flower, so as to cause the farina on the summits of the stamina to fall into the femlae flowers; by which means they will be sufficiently impregnated. By practising this method, the gardeners have now a much greater degree of certainty than formerly, in procuring an early crop of cucumbers and melons; and by this method the florists also have arrived to greater certainty of procuring new varieties of flowers from seeds, which is done by mixing the farina of different flowers.

Sow Cucumber and Melon Seeds.

The beginning of this month, you should remember to sow some cucumber and melon seed under to raise plants for ridging out, under hand or bell-glasses, i May.

Cabbages and Savoys.

If you did not transplant all the cabbge plants you intended to remove this spring, in March, let it be done at the beginning of this month, that the plants may take root before the dry weather comes on. Remember to water the plants as soon as they are set.

Let the earth be drawn up round the stems of forward cabbage plants; this will at once strengthen them, and encrease their growth.

Sow savoy and cabbage seed, to raise plants for a full winter crop. The situation of the spot where the seeds are sown should be open, and the seeds raked in equally.

You should now prick out into beds those cabbage and savoy plants which were sown in February and March; for by this means they will gain strength before they are planted where they are to remain.

The beds you intend for them, should be prepared of good earth, in an open situation, and about three feet and a half broad. Let the largest plants be drawn out regularly from the seed bed, and planted in the beds prepared for their reception, at four or five inches distance every way. Remember to water them immediately after they are planted, and to repeat it occasionally in dry weather.

At the same time let the plants left in the seed-bed be cleared from weeds, and well watered to settle the earth about their roots, which had been disturbed by drawing the larger.

Cauliflowers.

Draw up the earth about the stems of your early cauliflower-plants, for this will be of great service in promoting their growth; but be careful that no earth be drawn into their hearts, as that will greatly injure them.

The cauliflower plants raised from seed sown early in the spring should, about the latter end of the month, be planted out for good, in an open situation, on a piece of rich ground, into which some good rotten dung has been dug. They should be planted at about two feet and a half distance every way.

As soon as they are planted, let them be watered, and the operation frequently repeated in dry weather, till the plants have taken root.

Let your bell-glasses be now raised on props, in order to give the plants more air; and whenever any gentle showers fall, remember to take them entirely from the plants, for nothing refreshes them more than gentle showers.

As soon as you find your plants grow so fast as to fill the glasses with their leaves, dig slightly about the plants, and raise the ground about them in a bed, large enough to support the glasses, about four inches high, which will give your plants a great deal of room, by raising the glasses so much higher, when they are set over them again; and by this means you may keep them covered till the middle of this month, which could not otherwise be done without prejudice to the leaves.

Plant Kidney-Beans.

At the beginning of this month you may plant kidney beans of the early kind, on a spot of dry ground, defended from cold winds, and open to the sun.

Let them be dropped three inches apart, into drills an inch deep, and two reet and a half aſunder. Let the earth be drawn equally over them, but do not let them be covered above an inch deep.

Remember to chuſe a dry ſeaſon for planting theſe beans, becauſe much wet will rot them; a rainy ſeaſon is therefore very improper for this work.

Kidney-beans for a principal crop may be planted about the middle of this month. The ſpeckled dwarf kidney-bean, and the Batterſea white, are the proper kinds for planting now.

They ſhould be planted in an open ſituation, and the rows two feet and a half, or three feet diſtant from each other.

Mr. Miller recommends the ſcarlet bean, as preferable to all the other ſorts in goodneſs, and at the ſame time as much hardier. This ſort may now be ſown in the ſame manner, and on the ſame ſoil, as thoſe mentioned above; but they will be a fortnight later. This defect will, however, be well ſupplied by the continuance of the ſcarlet bean; for it will continue till the froſt puts a ſtop to it in autumn. At the ſame time the pods of this ſort, when old, are ſeldom ſtringy, have a much better flavour than the young pods of the other ſorts, and will boil greener.

Carrots and Parſneps.

You may yet ſow carrots; but it muſt be done at the beginning of the month, if you deſire to have your roots of a tolerable ſize.

But if a ſupply of ſmall young carrots ſhould be deſired, you muſt ſow a little ſeed at two different times this month; at the beginning and towards the latter end; by this means young carrots will be always ready for the table; for when the roots of the firſt ſown become too large, thoſe of the ſecond will ſupply their place.

You may alſo, at the beginning of the month, ſow parſnep ſeed, where wanted; but if you delay it any longer, it will not ſucceed.

Spinage.

Spinage ſeed may be ſtill ſown; it will grow, if ſown any time this month; and where a conſtant ſupply of this plant is wanted, a little of the ſeed ſhould be ſown often, at leaſt once a fortnight.

Let the ſpinage ſown the preceding months be now hoed, and the plants thinned out to four or five inches diſtant.

Radiſhes.

You ſhould ſow a little radiſh ſeed at three different times this month; for by that means a conſtant ſupply of young radiſhes may be obtained. About eight or nine days between each ſowing will be ſufficient.

The ſeed ſhould be ſown in dry weather on a rich ſpot of ground, in an open ſituation; but you muſt remember to water it frequently, both before and after the plants are come up.

Indeed all the crops of radiſhes ſhould be often watered in dry weather; for otherwiſe the roots will be ſmall, hot, and ſticky.

Let all your crops of radiſhes be thinned, where they have come up too thick; the plants ſhould be at leaſt two or three inches aſunder; and the beds carefully weeded.

Aſparagus.

You may yet plant aſparagus if required; the plants will grow freely; but they rarely ſucceed well, if not planted by the middle of the month. The ſame method is to be obſerved in planting aſparagus now, as mentioned in the former month.

If any of your aſparagus beds remain undreſſed, let them be forked up by the end of the firſt week in this month, and raked immediately after; for the buds are now in great forwardneſs; ſo that great care is neceſſary not to injure them.

Artichokes.

Artichokes may be yet planted if required; they will ſucceed, provided you plant them early in the month.

The ſame method is to be obſerved in planting them, as deſcribed in the preceding month.

Beans

Beans ſhould be planted at three different times this month, at the beginning, the middle, and the end.

The long podded beans are proper for planting now. This bean is a remarkable good bearer, and a fine eating bean; conſequently very proper for a family. This ſort may be planted any time this month. Allow a good diſtance between the rows.

You may alſo plant the Windſor, the Sandwich, or, indeed, any of the larger kinds.

The Mazagan and white-bloſſom bean, which are great favourites with many perſons, may alſo be planted any time this month. Let the rows be two feet and a half aſunder.

Both theſe are plentiful bearers, their ſtalks being generally loaded with pods from the very bottom to the top; and though ſmall, none exceed them for eating.

Peas.

A quantity of peas ſhould now be ſown to ſucceed thoſe ſown in March: and if a conſtant ſupply be deſired, ſome ſhould be ſown every fortnight at leaſt.

The marrowfats are very proper for ſowing at this ſeaſon of the year; though any other of the larger kinds of peas may be ſown any time this month; there is no danger of their ſuceeeding if the weather be kind.

You may even ſow hotſpurs, or any of the ſmaller kinds of peas, at this ſeaſon; for theſe will ſucceed if ſown early.

Let the earth be drawn up to the ſtems of peas which are come up, and advanced a little height. This will greatly ſtrengthen the plants, and forward them in their growth.

When the plants are advanced about ſix inches in height, the ſticks ſhould be placed where you intend themf; or the peas will now begin to want ſupport.

Potatoes.

If you omitted to plant potatoes in the former month, you may ſtill do it, but the ſooner it is done the better; for they rarely ſucceed well if planted after the middle of the month.

Turnips.

Turneps may be ſown any time this month; and the plants will appear in a few days after the ſeed is in the earth.

Let

Let the ſeed be ſown thin and equally in an open ſpot of ground, and raked in with a light and even hand.

Thoſe turneps which were ſown the former months ſhould now be hoed, and the plants thinned out to ſeven or eight inches diſtant from one another.

Lettuces.

Coſs, Sileſia, Imperial, or any other ſorts of lettuce may be ſown any time this month; and as a regular ſucceſſion of theſe plants is generally deſired, a little ſeed ſhould be ſown about once a fortnight.

The ſpot of ground intended for this purpoſe ſhould be in an open ſituation, and the earth well broken. When the ground is prepared let the ſeed be ſown equally, not too thick, and raked in lightly.

The coſs, Sileſia, or any other ſorts of lettuce ſown laſt month, or in February, ſhould be now tranſplanted.

In order to this let a ſpot of ground be choſen, and a little rotten dung ſpread over it. Dig the ground well, bury the dung properly, and rake the ſurface very ſmooth.

The lettuces ſhould be planted about ten or twelve inches diſtant from one another, every way. When this is done let the plants be watered immediately, and the operation frequently repeated in dry weather, till they have taken root.

Small Salleting.

Creſſes, muſtard, rape, radiſhes, and other plants of that kind, generally called ſmall ſalleting, ſhould be ſown once a week at leaſt.

In order to this a ſpot of rich ground ſhould be choſen, and the ſeeds ſown, each ſeparately, in ſhallow drills, and covered lightly with earth.

As ſoon as the ſeeds are ſown, water them moderately, if the weather be dry; for this will greatly promote their growth.

Celery.

Let a little celery ſeed be ſown the firſt or ſecond week in this month, in order to raiſe plants for ſucceeding thoſe which were ſown in March.

A rich light ſpot of earth muſt be choſen for this purpoſe, the ground broken fine, and the ſurface made very ſmooth and even. The ſeed is then to be ſown equally, not too thick, and either lightly raked in, or covered with fine earth about a quarter of an inch thick.

A few hoops ſhould, at the ſame time, be fixed acroſs the bed, and a mat drawn over the hoops occaſionally, when the ſun is hot, to prevent the earth from being too much dried. Water the bed now and then, and the plants, by this method, will riſe well, and grow freely.

Onions and Leeks.

You may yet ſow the ſeed of onions and leeks; either of them will ſucceed, if ſown at the beginning of the month; but if deferred any longer, there is great danger of ſucceſs, eſpecially with regard to the onions.

Purſlane.

Purſlane may now be ſown on a bed of light rich earth in the common ground. Water the bed often in dry weather, and ſhade it from the heat of the ſun, till the plants are come up, and have acquired a ſufficient degree of ſtrength.

Scorzonera and Salſafy.

About the middle of this month the ſeeds of ſcorzonera and ſalſafy ſhould be ſown for the principal crop; for that ſown any time before the middle of this month will ſoon run up to ſeed, and conſequently become uſeleſs.

Pot and Phyſical Herbs.

Baum, penny-royal, and camomile, ſhould now be planted; but remember to plant them where they are to remain, and at about eight inches from one another.

Mint will alſo ſucceed if planted this month, eſpecially if the following method be purſued:

Draw up from the old beds a proper quantity of the beſt plants, that is, thoſe which are ſtrongeſt, and five or ſix inches high. Theſe plants muſt be taken up very carefully, with ſome roots to each.

Plant them in rows, allowing ſix inches between each row, and ſet them about ſix inches apart in each row. Water them as ſoon as they are planted, and repeat the operation frequently in dry weather, till the plants are well rooted.

Tanſey, tarragon, cives, and ſorrel, may alſo be planted at this ſeaſon; but remember to plant them where they are to remain, and to allow eight inches between every plant.

Slips of ſage may likewiſe now be planted; they will grow freely. Let the ſlips be about ſix or ſeven inches long, and planted in a ſhady border four or five inches apart from one another. Put the ſlips into the ground within two inches of their tops, and water them frequently in dry weather.

They will become fine plants by September, when they may be tranſplanted into beds of good light earth, at about eight or nine inches diſtance every way.

Thyme, hyſſop, ſavory, and marjoram will grow freely from ſlips or cuttings, planted any time this month. They ſhould be planted in a ſhady place, and treated in the ſame manner as before directed for ſage.

Rue, roſemary, lavender, ſouthernwood, wormwood, and lavender-cotton, may alſo now be propagated by ſlips or cuttings.

Theſe ſlips or cuttings ſhould be about ſix or eight inches long, and planted in a ſhady border ſix inches from one another. Remember to ſet the ſlips or cuttings full half way in the ground; and to water them frequently.

They may be tranſplanted, in September, to the place where they are intended to remain, at the diſtance of a foot from one another.

Naſturtium ſeed may be ſown in a drill about an inch deep. Let the ſeeds be placed two or three inches apart in the drill, and the earth drawn equally over them. They will grow and flouriſh freely.

Thyme, marjoram, ſavory, and hyſſop, may now be ſown ſeparate on a bed of light earth. Let the ſeeds be ſown, in ſeparate ſpots, on the ſurface, and raked in with a light and even hand.

Borage, bugloſs, clary, carduus, burnet, ſorrel, and marygold, may now be ſown in ſeparate ſpots of good earth, and raked in evenly.

It is not yet too late to ſow parſly, chervil, and coriander. Let the ſeeds be ſown equally, not too thick, in ſhallow drills, and covered with earth about a quarter of an inch thick.

The NURSERY.

Grafting.

The operation of grafting may ſtill be performed on fruit-trees of the lateſt kind; but it muſt be done during the firſt week in the month, or it will not ſucceed.

Hollies of the variegated kinds may be grafted till the middle of the month; for they are not ſo forward as fruit trees.

The common plain holly is the proper ſtock to graft the variegated kinds upon; but the ſtocks for this purpoſe muſt be four years growth at leaſt; if they are five or ſix it will be the better.

In order to this let ſome good cuttings, or grafts of the beſt variegated kinds be procured; they muſt be cuttings of the laſt ſummer's growth. Let theſe be carefully grafted, in the manner already deſcribed, and there will be little reaſon to fear the ſucceſs.

Inarching.

The operation of inarching may alſo be now performed on evergreens, or indeed, on whatever kind of trees or ſhrubs you may be deſirous of propagating by that method; which is principally intended for thoſe kinds of trees and ſhrubs which are not eaſily raiſed from ſeed, or any other general method; for it ſhould be remembered, that moſt ſorts may be propagated by inarching.

With regard to the evergreen kinds, they may be inarched with ſafety this month; but the other ſorts generally ſucceed beſt, when inarched at the beginning.

New Grafted Trees.

Your new grafted trees ſhould be carefully examined; for the clay is too often ſubject to fall off, or at leaſt crack in ſuch a manner as to admit both air and wet to the grafts.

Whenever you find this to be the caſe, let the old clay be taken entirely away, and ſome more, which has been previouſly well wet, and well wrought, placed immediately in its room. Obſerve to cloſe this perfectly in every part, ſo that neither air nor wet can penetrate to the graft.

If you find any ſhoots produced from the ſtock below the graft, let them be rubbed off cloſe; for theſe will impoveriſh the grafts, and perhaps in the end deſtroy them.

New Budded Trees.

Look over your new budded trees frequently about this time, for thoſe which were budded during the laſt ſummer will now be making their firſt ſhoots, and therefore require ſome care and attention.

Inſects often attack the tender ſhoots from the buds; and if not prevented will greatly hinder their progreſs, if not totally deſtroy them. Attention therefore is neceſſary; and by attention the injury may be, in a great meaſure at leaſt, prevented.

In order to this, examine the extremities of the young ſhoots, and where you find any of the leaves curled up, let them be carefully taken off, for they are full of ſmall inſects. By continuing this practice, the vermin will be deſtroyed, and conſequently the injury prevented from ſpreading any farther.

At the ſame time be very careful to rub off all the ſhoots beſides the bud, that the whole efforts of the ſtock may go to ſupport the buds: for all the others will have a tendency to injure and ſtarve them.

Tranſplanting.

At the beginning of this month, you may tranſplant moſt ſorts of ever-greens; particularly cedars, cypreſſes, firs, phillyreas, alaternuſes and pyracanthas, bays, hollies, ever-green oaks, ciſtuſes, citiſuſes, and ſeveral other ſorts of ever-greens.

Remember to chuſe a calm cloudy day for this work, and if gentle ſhowers of rain fall, ſo much the better; for calm ſhowery weather is much the beſt for removing trees and ſhrubs at this ſeaſon.

As ſoon as they are planted, let them be well watered to ſettle the earth about their roots. Some mulch or litter ſhould alſo be laid on the ſurface of the ground; for this will prevent the ſun's drying the earth too much, and preſerve a proper degree of moiſture to the roots.

Deſtroy Weeds.

The weeds will now grow very faſt between the rows of young trees; let them therefore be deſtroyed, by hoeing the intervals.

But remember to uſe a ſharp hoe, and chuſe a dry day for this purpoſe. By this means you will eaſily keep your plantations clean and neat, without much labour; but if they are ſuffered to grow for any length of time, it will require double labour to extirpate them, beſides the injury they will do to the young trees.

Sow Ever-greens, Flowering-ſhrubs, &c.

All the ſeeds of ever-greens, and other ſeeds intended to be ſown this ſpring, muſt be put into the ground this month.

The ſeeds of hardy greens, ſuch as the cedar, cypreſs, juniper, ever-green oak, acorns, and bays, are the ſorts that will yet ſucceed.

They muſt be ſown in beds of light earth, in the common ground. Some indeed ſow them in boxes or pots, in order to remove them to different parts of the garden, according to the ſeaſon of the year.

Let the beds be about three feet broad, the earth broken very fine, and the ſurface laid perfectly even.

Each ſort of ſeed muſt be ſown ſeparate, and covered with a proper depth of rich light earth; that is, from half an inch to an inch, according to the ſize of the ſeed or kernels.

If you ſhould now ſow any of the more choice or tender kinds of trees or ſhrubs, you would do well to let it be done in pots, and the pots plunged into a hot-bed; for this will greatly forward their growth. Where this convenience, however, is wanting, they may be ſown in beds, in the common ground, where very few, eſpecially of the American ſorts, will miſcarry.

Management of Seed Beds.

Let the ſeed-beds be watered once every two or three days in dry weather, both before and after the plants begin to appear. Let the waterings be moderate and gentle; for if you at any time apply the water haſtily, it would probably waſh away the earth from the ſeed, and alſo from the young plants when they begin to appear.

You ſhould alſo be careful to ſhade, in the middle of hot ſunny days, all kinds of ſeedling trees and ſhrubs, from the time they appear till they have been up for ſome time. This will be almoſt as neceſſary as water.

It may eaſily be done by fixing hoops acroſs the bed, and drawing mats over them when neceſſary.

If your ſeeds are ſown in boxes, pots, or tubs, let them be removed to a ſhady ſituation about the middle or latter end of the month.

But wherever they are ſown, remember to keep the beds, pots, &c. free from weeds; for if this be neglected the weeds would choke the plants, as they grow much faſter. As ſoon therefore as any weeds appear, let them be taken away; at leaſt before they get any great head. This muſt be done carefully by hand weeding.

The FRUIT-GARDEN.

Plant Fruit-Trees.

You may yet plant apple, pear, plum, and cherry trees, where wanting; they will ſtill ſucceed; but the ſooner it is done the better. It ſhould not be delayed beyond the firſt week in the month.

Be ſure you give each tree a good watering as ſoon as planted; it will be of the utmoſt ſervice, as it will nouriſh the tree, and ſettle the earth cloſe about its roots. The waterings ſhould be repeated once a week, in dry weather.

New Planted Trees.

All new planted trees in general ſhould be watered once a week in dry weather, and remember to water their heads as well as their roots.

At the ſame time let ſome mulch be laid on the ſurface of the ground round their ſtems; this, with moderate waterings, will preſerve a proper degree of moiſture to their roots, and prove very ſerviceable to their growth.

Vines.

As your vines planted againſt walls will, by the latter end of the month, have made ſome ſhoots, they ſhould then be looked over; and all ſuch as appear to be uſeleſs, rubbed off. The old branches generally ſend forth ſhoots; but as theſe rarely produce either grapes or wood proper to bear fruit, they ſhould all be rubbed off cloſe.

The ſhoots that ariſe from the laſt year's wood ſhould not be taken away at preſent, except where two ſhoots ariſe from one eye, the worſt of which ſhould be rubbed off; for if both are left they will ſtarve each other, ſo that the fruit of neither will be good.

Having thus cleared away the uſeleſs ſhoots, let the others, when of a due length, be trained cloſe to the wall in a regular manner, ſo that each may equally enjoy the advantage of the ſun and air; this will at once promote the growth of the ſhoot and that of the fruit.

By practiſing this method the grapes will be fine, the bunches large, and they will ripen early and well.

With regard to vines planted in the vineyard, ſtakes ſhould now be fixed near them for their ſupport, provided it was not done before. Let theſe ſtakes be firmly fixed in the ground, and the vines tied to them at equal diſtances.

Remember to keep the ground between the rows of vines entirely free from weeds; for the ſucceſs, with regard to the growth and fineneſs of the fruit, greatly depends upon keeping the ſurface clean.

Whenever, therefore, any weeds make their appearance, let them be deſtroyed by the hoe the firſt dry day, before they arrive at any conſiderable bigneſs.

Peach, Apricot, and Nectarine Trees.

About the latter end of this month, look over your peach, apricot, and nectarine trees, diſplacing all ſuch young ſhoots as are evidently uſeleſs. That is, all ſhoots produced foreright ſhould be rubbed off cloſe: together with thoſe which ariſe in parts of the tree where they are not wanted, or where they cannot be neatly trained in.

But all ſhoots properly ſituated for training in muſt be left, and, when of a proper length, trained cloſe and in a regular manner to the wall.

Pruning.

If any pruning ſtill remains to be done, let it be entirely finiſhed the firſt week in the month; for after that time no tree ſhould be touched with the knife.

Grafting.

Apples, pears, plums, and cherries, may yet be grafted with ſucceſs, provided the operation be performed at the beginning of the month; but after that time the grafts will not take.

New Grafted Trees.

Look frequently over your new grafted trees, to ſee if the clay keeps cloſe about them; for it is apt to crack and fall off. Where this happens, let the old clay be taken away, and new placed in its ſtead; for no wet muſt be admitted to the graft.

At the ſame time all the ſhoots that riſe from the ſtock below the graft, muſt be rubbed off as ſoon as produced; for theſe, if ſuffered to remain, would rob the graft of its nouriſhment, and, conſequently, prevent its ſhooting.

New Budded Trees.

Your new budded trees muſt alſo now be looked over; we mean thoſe which were budded laſt ſummer; for they will now begin to ſhoot. Examine them carefully with regard to inſects, deſtroying them wherever they are found. If the leaves curl up, inſects are the cauſe of it, and will, if not prevented, ſpoil the ſhoot. Let therefore the curling leaves be picked off; this will prevent the miſchief from ſpreading further.

Remember that no ſhoots which come from the ſtock ſhould be ſuffered to remain. Let them, therefore, be taken off as ſoon as they appear, and nothing to be left to draw nouriſhment from the bud.

Thinning of Fruit.

About the latter end of this month, look over your apricot trees, and where you find the fruit too thick, let ſome of it be taken away; obſerving to leave the moſt promiſing and beſt ſhaped fruit, but not ſo cloſe together as to touch when grown to their full ſize.

In order to this begin at one ſide of the tree, and look over the branches regularly, one by one, ſingling out on each branch all the fruit you would leave before

any are taken away. When the faireſt and beſt ſituated fruit are thus ſingled out, let the reſt on that branch be cleared away. When you have finiſhed one branch go to the next; and proceed regularly from branch to branch through the whole tree.

Strawberry Beds.

Take care that your ſtrawberry beds be now kept free from weeds. You ſhould alſo clear away the runners from the plants as they advance; unleſs new plantations are wanted, when ſome of the ſtrongeſt runners ſhould be ſuffered to remain.

They will require very frequent waterings in dry weather, eſpecially when they are in bloom; for if they are not well ſupplied with water at that ſeaſon, the crop will be thin, and the fruit ſmall and ill taſted.

Deſtroy Inſects.

Inſects are very deſtructive to fruit-trees, ſo that too much care cannot be taken to deſtroy them. This is the ſeaſon when they begin to breed on the leaves of young trees, and alſo on thoſe of old trees, which are of weaker growth. Proper means ſhould therefore be taken to remove the evil before it ſpreads too far.

In order to this look over your trees frequently; and where you perceive any of the leaves curled up, you may be ſure to find inſects there. Let the worſt of theſe leaves be taken off immediately, and the branches well and frequently watered in dry weather.

If you perceive your trees, whether old or young, over-run with inſects, pluck off all the curled leaves, and ſcatter tobacco duſt over the branches where the inſects are found. This ſhould be done in the morning, and ſuffered to remain two or three days on the tree.

If tobacco duſt cannot eaſily be had, ſteep ſome tobacco in water, about twenty-four hours, and ſprinkle the trees where the inſects are, with the ſolution, which will totally deſtroy them, without injuring either the fruit or the tree.

The PLEASURE or FLOWER-GARDEN.

Sow Perennial and Biennial Flowers.

You muſt ſow all the perennial and biennial plants intended to be ſown this ſeaſon.

The ſorts proper to ſow now are ſweet-williams, wall-flowers, columbines, ſtock july-flowers, Canterbury bells, pyramidal campanulas, tree primroſe, Greek valerian, hollyhocks, French honeyſuckles, ſingle catchfly, roſe campion, and ſcarlet lychnis.

The ſeed ſhould be ſown in beds of light earth three feet wide; and the larger ſort of ſeed covered about half an inch, and the ſmaller about a quarter of an inch deep.

Sprinkle the beds frequently with water, in dry weather, both before and after the plants appear above the ſurface. By this means the plants will grow freely, and ſoon acquire a ſufficient degree of ſtrength.

Tranſplant Perennial Plants.

You may yet tranſplant perennial plants with ſucceſs, provided it be done at the beginning of the month. Moſt of the ſorts will ſucceed at this ſeaſon, particularly golden rods, Michaelmas daiſies, perennial aſters, perennial ſun-flowers, Canterbury bells, columbines, Greek valerian, ſcabiouſes, campanulas, catchfly, roſe campion, rockets, lychniſes, batchelors buttons, ſweet williams, pinks, carnations, polyanthuſes, primroſes, double daiſies, double camomile, thrift, London pride, gentianellas, and ſome others.

Remember to take up the plants with balls of earth about their roots, if poſſible, and plant them again immediately in the places where they are to remain.

Water them well as ſoon as planted, and repeat the operation frequently in dry weather. By this means the plants will all flower this year, each at its reſpective ſeaſon.

Dreſs the Pots containing Perennial Plants.

Thoſe pots of perennial plants which were not dreſſed in March, muſt now be done in the following manner.

Looſen the earth on the top, and round the ſides of the pot; take out the looſe earth, and clear away all the decayed leaves from the plant: when this is done, fill the pots again with rich new earth, and give the plants a gentle watering.

This dreſſing will be very beneficial to the plants, and ſhould be done the beginning of this month, if omitted in March.

Remember alſo to water all the plants that are in pots, in dry weather. This ſhould be done frequently, or the plants will miſcarry.

Tender Annual Plants.

A new hot-bed ſhould now be made for the reception of the tender annuals ſown in February.

By tender annuals, we mean cockſcombs, tricolars, double balſams, globe amaranthus, the egg plant, the double ſtramonium, and the ficoides, or ice plant.

Where theſe curious plants are deſired to blow in any tolerable degree of perfection, they muſt now be brought forward by the aſſiſtance of a regular and proper degree of artificial heat; and if that circumſtance be duly attended to, there is no danger of the plants proving ſtrong, and their flowers being large and beautiful.

The bed for this purpoſe ſhould be full two feet thick, and made of the beſt hot dung well prepared.

Set the frame upon the bed; and when the burning heat is over, lay on the earth, which muſt be light and dry, not ſifted, but very well broken with the ſpade and hands, and laid ſix or ſeven inches thick on every part of the bed.

In about twenty-four hours after the earth has been laid on the bed, it will be in a proper condition to receive the plants, which muſt then be taken out of their old bed, with a ball of earth about their roots, and planted in the new bed full ſix inches apart, every way. Give them a little water as ſoon as they are planted, to ſettle the earth about their roots; put on the glaſſes, and when the ſun is ſo powerful as to cauſe the plants to flag, throw a ſingle mat over the glaſſes, continuing this practice till they have taken root.

Remember to raiſe the glaſſes a little every day, that the ſteam from the dung may paſs off freely; and if you perceive any quantity of ſteam in the bed, let one corner of the glaſſes be raiſed at night, hanging a mat before the opening.

As ſoon as you perceive the plants have taken root, and begin to puſh, let them have plenty of free air every day, in mild and calm weather; for nothing ſtrengthens plants more than a free circulation of air. But the glaſſes muſt be ſhut down every night, provided there be no ſteam in the bed, and a mat thrown over the glaſſes.

Remember alſo to refreſh them frequently with water, giving them a little at a time; for this will greatly improve their growth.

You muſt be careful to obſerve, that when the plants are grown ſo high as almoſt to touch the glaſſes, the frame muſt be raiſed about ſix inches, at the bottom, in order to give them room to ſhoot; continuing to raiſe the frame in proportion to the growth of the plants.

But you muſt remember to cloſe up the vacant ſpace at the bottom every time you raiſe the frame, by nailing mats at the bottom, that no air may enter but at the proper place. Multiplying or drawing frames are very uſeful for this purpoſe, as they may be raiſed to the height deſired, without any trouble or danger of injuring the plants, by an admiſſion of too much air at the bottom. A drawing frame may be made in the following manner.

Let two, three, or more different frames be made of the ſame length and breadth, each about nine or ten inches deep except the frame for the glaſſes, which muſt be twelve inches deep in front, and eighteen at the back. Let all theſe be made to fit one another in a very exact manner, ſo as to be eaſily fixed upon the top of one another, and, when fixed in that manner together, to appear as one frame.

The very nature of the conſtruction will ſufficiently ſhew the manner in which they are to be uſed; it is this:

Let the frame containing the glaſſes be firſt placed upon the bed; when the plants have almoſt reached the glaſſes, let the frame be taken up, and one of the ſhallow frames placed in its ſtead, fixing the frame with the lights upon it.

By the addition of this frame, there will be ten inches more room for the plants to ſhoot; and when they have filled that ſpace, let another frame be added, obſerving always to place the frame containing the lights uppermoſt.

About the middle of this month, another hot-bed muſt be prepared for thoſe cockſcombs, tricolars, and other plants of that kind, ſown in March.

This bed muſt be at leaſt twenty inches thick of dung, a frame fixed on it, and, when the burning heat is over, covered with dry earth five or ſix inches deep.

The plants are to be pricked into this bed at the diſtance of three or four inches from one another. When this is done, give the plants a gentle watering; put on the glaſſes, and ſhade them from the ſun, till they are well rooted.

Remember to raiſe the glaſſes every day as occaſion requires, to let out the ſteam, and give the plants freſh air.

The ſame management, in every reſpect, muſt be purſued for theſe, as for thoſe ſown in February, and which has been already laid down.

Hardier Kinds of Annual Plants.

Some of the more hardy kinds of annual plants will now be fit to be removed, particularly the marvel of Peru, China aſters, balſams of the common kinds, African marygolds, chryſanthemums, ſcabiouſes, capſicums, and ſeveral others.

A ſlight hot-bed muſt therefore be made for theſe plants about the middle of this month; twenty inches of dung will be full ſufficient, covered with five or ſix inches of good earth.

When the bed is in a proper condition, draw from the ſeed-bed ſome of the ſtrongeſt plants, and prick them into the new bed four or five inches diſtant from one another, giving them a little water. Place the frame on the bed, or, if a frame be wanting, fix ſome hoops acroſs the bed, and let mats be drawn over them every night, and alſo during the day, when the weather is cold. At the ſame time remember, when the weather is warm, to ſhade the plants from the rays of the ſun, till they have taken root.

In this bed the plants are to remain about five weeks, when they may be taken up, with a ball of earth about their roots and planted where they are intended to flower.

Sow Chryſanthemums, Marvel of Peru, &c.

The ſeeds of chryſanthemums, marvel of Peru, African marygolds, balſams, China aſter, Indian pink, and ten-week-ſtock, may yet be ſown with ſucceſs.

But it muſt be done the firſt or ſecond week in the month, on a moderate hot-bed, often refreſhed with water.

The bed muſt be covered with a frame, or arched over with hoops, and mats drawn over it every night in bad weather.

As ſoon as the plants appear, let them have plenty of freſh air, by removing the coverings entirely every mild day; remembering to cover them at night, eſpecially in bad weather.

Theſe plants will be fit to prick out into beds of light earth, in the natural ground, about the middle of May, where they are to continue a month, or five weeks, and then taken up with balls of earth about their roots, and planted in the borders, where they are to flower.

Sow Hardy Annuals.

It is not yet too late to ſow the ſeeds of hardy annuals in the borders, and other parts of the garden.

The following ſorts will yet ſucceed, namely, convolvulus major and minor, Tangier and ſweet-ſcented peas, naſturtiums, lupins, larkſpur, flos Adonis, ſweet ſultan, candy tuft, dwarf lychnis, Lobel's catchfly, Venus navelwort and looking-glaſs, Virginia ſtock, ſnails, caterpillars, lotuſes, dwarf and large annual ſun-flower, laveteras, oriental mallows, and many other kinds of hardy annuals.

The ſeeds ſhould be ſown ſeparate, in ſmall patches, in different parts of the borders, according to the method deſcribed in the two former months.

Remember to water the patches frequently in dry weather, both before and after the plants appear; for otherwiſe they will be weak, and their flowers indifferent.

After the plants have been up about a fortnight, let them be thinned, where they appear too thick, remembering to clear away the weakeſt, and leaving the ſtrongeſt plants to flower.

Manage-

Management of Tulips, Hyacinths, Ranunculuſes, &c.

Tulips, hyacinths, ranunculuſes, and anemonies, will now advance apace towards their bloom.

The more curious ſorts of theſe flowers muſt therefore be now managed with care. They muſt be defended from heavy rains, and high winds; nor muſt the ſun be ſuffered to ſhine freely upon them; the former would greatly injure the plants, and the latter cauſe them ſoon to decay.

Hoops muſt therefore be kept conſtantly over the beds, and mats, or canvas, drawn over them occaſionally. By this means you will not only preſerve the beauty of the flowers, but alſo continue the bloom much longer.

Remember that the hoops muſt be pretty loſty, and nailed to ſtakes about three feet high, fixed at proper diſtances on each ſide of the bed.

Let the mats, or canvas, be drawn over the hoops, about nine or ten in the morning, every ſunny day, and continue there till four or five in the afternoon, while the plants are in flower.

When it rains hard, or when the winds are ſtrong, the mats muſt alſo be drawn over the hoops; otherwiſe the flowers will be beat down, and many of their ſtalks broken.

The flowers ſhould alſo be ſheltered every night, when there is the leaſt appearance of bad weather.

Some of the ſtalks, particularly of the hyacinths, are not able to ſupport their flowers; in this caſe, ſhort ſticks ſhould be placed near each plant, and the ſtalk neatly faſtened to it with yarn, baſs, or ſome other ſoft ſubſtance.

Carnations.

You muſt now ſupport the flower-ſtalks of your carnations, as they will ſhoot apace at this ſeaſon.

In order to this, let a ſufficient number of handſome ſtraight ſticks, of a proper length, be procured. Theſe ſticks muſt be thruſt down carefully, near the plants; and the flower-ſtems, when advanced to a proper height, faſtened to them. Remember to tie them between the joints, that the ſtalks may have full liberty to ſhoot; and as the ſtalks advance higher, continue to tie them carefully to the ſticks.

It will alſo be neceſſary to place ſticks near ſuch carnations as are planted in the borders, for ſuch ſupports will ſoon be neceſſary.

But a further care is neceſſary for thoſe carnations that are planted in pots; indeed too much attention cannot be paid them at this ſeaſon. Every thing that has a tendency to encourage their growth ſhould now be put in practice.

The pots ſhould be kept perfectly free from weeds, and the plants from decayed leaves. The ſurface of the earth in the pots ſhould be ſtirred now and then; for this will at once give an air of neatneſs to the whole, and greatly encourage the plants in their growth.

Let the plants be often watered in dry weather; every ſecond or third day, at leaſt; but let it be moderate. For if this neceſſary aſſiſtance be wanting, the flowers of the plants will be at once ſmall, and ill-ſhaped.

Sow the Seeds of Carnations and Pinks.

It is not yet too late to ſow the ſeeds of carnations and pinks; eſpecially if it be done the firſt or ſecond week in the month.

In order to this, let a ſmall ſpot of rich light ground be neatly dug, and the ſurface laid very even. Divide this ſpot into beds of about three feet broad, and ſow the ſeed of each ſort ſeparately, on the ſurface, pretty thick; covering the ſeed with fine light earth about a quarter of an inch deep.

If the weather ſhould prove dry, theſe beds ſhould be often ſprinkled gently with water; and the plants will appear in about forty days after they are ſown.

This is not the place to give the further management of theſe plants; but it will be reſumed in the ſucceeding months.

Management of Auriculas.

Care muſt now be taken to protect the more curious ſorts of auriculas from heavy rains, ſtrong winds, and too much ſun; for they will now begin to blow.

Were the ſun admitted to ſhine freely on the plants, they would ſoon fade; a ſmall ſhower of rain, or a blaſt of wind, would deprive theſe flowers of the meally duſt which covers their ſurfaces, and compoſes a principal part of their beauty.

Let therefore the pots, as faſt as the flowers open, be removed, and placed on the ſhelves of the ſtage, or where the flowers may be occaſionally protected from ſuch weather as would effectually deface the bloom.

Remember that the top of the ſtage muſt be always covered, but the front only occaſionally. In order to this, a mat or canvas ſhould be nailed to the front, by way of a curtain, and contrived in ſuch a manner, that it may be let down or drawn up at pleaſure. By this means the flowers may be effectually ſheltered from ſharp, or ſtrong winds, and driving rain. But remember to let the curtain be let down no lower than will be ſufficient to ſhade the plants; and never to let it remain down any longer than is abſolutely neceſſary for the defence of the flowers.

Examine the pots once every day, at leaſt, after they are placed on the ſtand, to ſee where water is wanting, and to let that want be immediately ſupplied. But remember not to let the water fall on the flowers, for that would waſh off their beautiful duſt; and that it be always given them in moderate quantities.

Let the ſurface of the earth in the pots be kept perfectly neat, free from weeds, and every ſort of litter; nor ever ſuffer any decayed leaves to remain on the plants: let them be taken away as ſoon as diſcovered.

If you intended to ſave any ſeed from your auriculas, remember to mark the plants you deſtine for this purpoſe when in full bloom. A large flower that blows regularly, and lays itſelf perfectly flat, ſhould be choſen for this purpoſe. The colours ſhould be lively; the eye large and bright; and the ſtalk tall, ſtraight, and proportionally ſtrong.

As ſoon as you have marked the flowers you intend for ſeed, let the pots be immediately removed off the ſtage, and plunged into a border where the plants can enjoy the benefit of the morning ſun till about ten or eleven o'clock, but no longer.

Remem-

Remember to water them frequently in dry weather; to ſuffer no weeds to grow either in or near the pots; nor let them at any time be too much ſhaded with any large growing plants.

But auriculas are not only encreaſed from ſeed, they are alſo propagated from ſlips, or ſuckers, taken from the old plants; and this is the ſeaſon to take them off and plant them.

Each ſlip ſhould be planted ſingly, in a ſmall pot of freſh earth, and have a little water given them as ſoon as they are planted. The plants will take root freely, provided they are watered moderately now and then, and depoſited in a ſhady place.

Management of Seedling Auriculas and Polyanthuſes

Theſe plants, when young, are not able to bear the ſun; conſequently they muſt be occaſionally ſhaded from it.

Let therefore the tubs, pots, or boxes, in which theſe plants are growing, be, about the latter end of the month, removed into the ſhade. But remember to chuſe ſuch a ſituation as is open to the morning ſun till about nine o'clock, and ſhaded the remainder of the day.—They muſt be often refreſhed with water, in dry weather.

You may yet ſow the ſeed of polyanthuſes and auriculas, provided it be done the firſt week in the month; but, after that time, there is great danger of its not ſucceeding.

Plant flowering Shrubs.

The althæa frutex, Perſian lilac, bladder and ſcorpion ſenas, honey-ſuckles, jaſmines, ſyringas, laburnums, and ſome other flowering ſhrubs, will yet bear tranſplanting, but the ſooner it is done, the better; it ſhould not exceed the firſt week in the month.

Remember to water them well, when they are firſt planted; and, if the ſeaſon be dry, repeat the operation once or twice a week.

Plant Evergreens.

Several evergreen trees and ſhrubs, particularly pines, firs, cypreſs, junipers, and cedars; hollies, bays, yews, laurel, Portugal laurel, lauriſtines, phillyreas, alaturnuſes, pyracanthas, citiſuſes, ciſtuſes, arbutus, evergreen caſſine, and mangolias, may ſtill be planted; but it ſhould be done the firſt week in the month.

Remember to open a large hole for each tree or ſhrub, and, when deep enough, to looſen the ground well at the bottom. When this is done, pour into each of them a pot of water, and work up the earth and water with your ſpade. Then place each plant upright in its hole, and let the earth be well broken and filled in about the roots. When all is in, tread the earth gently round the ſtem, and form the upper part into a hollow form, to contain a proper quantity of water.

When you have not far to bring the plants, let them be taken up with balls of earth about their roots, and placed in the holes with the balls entire.

But, however that be, remember to give them a good watering as ſoon as planted, in order to ſettle the earth about their roots; and then to lay ſome mulch or litter on the ſurface of the ground round the ſtem of each plant; for, otherwiſe, the earth will dry too faſt about their roots, and conſequently prevent their growth, if not totally deſtroy them.

You muſt alſo remember to place ſtakes near ſuch as require ſupport; and to faſten the ſtem of the plants to them, that the wind, by blowing them to and fro, may not diſplace their roots.

Plane Box and Thrift.

Box and thrift may be tranſplanted for edgings to beds, or borders, where wanted; both will grow freely, and the latter, if planted cloſe and neat, will form a very agreeable edging.

Stick and trim flowering Plants.

You muſt now careſully inſpect your flowering plants, and place ſticks to ſuch as ſtand in need of ſupport, before they acquire an unſightly growth.

Let the ſticks be proportioned to the height of the plant, fixed firm and upright in the ground, and the ſtalks or ſtems of the plants tied neatly to them with ſome ſoft ſubſtance.

Clear away all the decayed leaves from every part of the plant, together with all the ſtraggling and broken ſhoots; for theſe will injure the plant, render it unſightly, and prevent its growth.

Break up and turn Gravel Walks.

Such gravel walks as were not broken up and turned in March, muſt now be put in order for the ſummer ſeaſon. By turning them at this time of year, you will at once deſtroy the weeds and moſs, and give the ſurface a freſh and lively appearance, which will continue the whole ſummer.

The method laid down in the foregoing month muſt be obſerved in turning, or laying, gravel-walks at this ſeaſon. That is, it muſt be done in dry weather, and when you have advanced about twenty feet, to tread, rake, and roll the ſame regularly as you go on; for gravel never binds ſo well as when it is firſt ſtirred. The roller alſo will, at that time, have a much greater effect in making the body of the walk firm, and the ſurface cloſe and even.

It will be alſo neceſſary to roll gravel walks that have been either new made, or turned very frequently, twice a week, at leaſt; for by frequent rolling, the walks will be rendered firm and beautiful, and the growth of moſs and weeds in a great meaſure prevented.

Mow and roll Graſs Walks, &c.

This is the ſeaſon for putting graſs walks, lawns, and other pieces of graſs in the garden, into the beſt order. Let the graſs therefore be regularly mown, and frequently rolled. In mowing your graſs, be particularly careful to cut it as cloſe and even as poſſible; for the walks and lawns will have a very diſagreeable appearance, if the ſtrokes of the ſcythe are ſeen.

It will be neceſſary to mow your graſs-walks once a week, to keep them in any tolerable order; for if you ſuffer the graſs to grow rank, you will find it, at once, laborious and difficult to mow it ſmooth and level; but if the ſcythe be frequently applied, the mowing will be performed with eaſe and exactneſs. Remember to roll the graſs the day before you intend to cut it; for you will find the benefit of it in the morning.

Let your graſs-walks be rolled frequently; for this will give the walk a very neat appearance, render the

graſs thick at the bottom, and greatly contribute to the eaſe of the mower.

Whenever you perceive any worm-caſts upon your graſs, let theſe be broken, and ſpread with a pliable pole, before you apply the roller; for the worm caſts, when firſt broken and ſpread, will readily ſtick to the roller, eſpecially if the roller be of wood. By this means the graſs will be made perfectly clean, and you may mow it to a much greater degree of exactneſs.

Deſtroy Weeds.

Weeds will now riſe plentifully, in every part of the garden, among the plants; let them therefore be deſtroyed, either with the hoe or hand, before they grow larger.

Remember to keep your hoe ſharp, and to take the advantage of a dry day to uſe it, cutting the weeds up clean below the ſurface. At the ſame time, let the ground, in the intervals between the plants, be ſtirred as you go on, and all the dead leaves and ſtraggling ſhoots be taken away.

Rake the borders neatly with a ſmall rake, taking away all the weeds and litter, and laying the ſurface very ſmooth and even.

MAY.

Work to be done in the KITCHEN-GARDEN in May.

Cucumber Plants in Frames.

YOUR cucumber plants under frames will now require an aſſiduous attendance, as they will be in full perfection for bearing.

They muſt be frequently, twice a week at leaſt, refreſhed with moderate waterings; for if this be omitted, many of the fruit will drop off, and the remainder prove ſmall and ill-taſted. The beſt time for doing this, is about three or four o'clock in the afternoon.

Air muſt be freely admitted to the plants every warm day; for the ſun has now great power; ſo that, if the glaſſes were kept too cloſe, the heat would deſtroy the plants. Let therefore the upper ends of the lights be raiſed every warm ſunny morning, about ſeven or eight o'clock; and continue to raiſe the glaſſes higher, in proportion as the heat of the day encreaſes.

But remember to ſhut the lights down every warm evening about ſix or ſeven o'clock; in cold evenings, ſhut them down an hour or two ſooner.

Let the plants be ſhaded from the ſun in very hot days, from eleven till two o'clock.

Remember to keep your glaſſes at a conſiderable diſtance above the plants. This diſtance ſhould not be leſs than eight inches in front, and twelve at the back of the frame. This will give them a larger ſpace of air, and, at the ſame time, leſſen the fierce effects of the ſun; ſo that there will be leſs danger of ſcorching their leaves, and parching up their roots.

Let therefore the frame be now raiſed to the above height, and you will ſoon perceive the benefit of it, by the growth of the plants.

Cucumbers under Hand or Bell Glaſſes.

You may now plant out cucumbers under hand or bell-glaſſes; and thoſe planted at the beginning of the month, will have fruit fit for the table about the beginning of June, and continue bearing till the plants are deſtroyed by the cold weather.

But a ſlight hot-bed muſt be made to plant them in, in order to bring them forward, at firſt; and it will be the beſt method to have all, or, at leaſt, the greater part of theſe hot-beds within the ground.

Let a rich ſpot of ground be choſen for this purpoſe, and there dig a trench two feet ſix inches wide, and about twelve or fifteen inches deep, laying the earth thrown out along the ſides of the trench.

Fill this trench with freſh horſe-dung, and raiſe it about three inches above the ſurface of the ground; for the bed muſt be, at leaſt, fifteen or eighteen inches thick of dung.

When this is done, cover the bed with the earth that was thrown out of the trench; this muſt be laid eight or nine inches thick over the top of the dung, and the earth extended ſix inches on each ſide of the bed beyond the dung.

Then mark out the holes for the plants exactly in the middle of the bed, at three feet ſix inches from one another.

In each of theſe holes ſet two or three good plants, and give them a little water. Put on the glaſſes, and ſhade the plants from the ſun till they have taken root.

The long prickly, and the long green and white Turkey cucumbers are the moſt proper for theſe plantations.

Remember to give theſe plants air every day in calm warm weather, by tilting up one ſide of the glaſſes, and alſo to refreſh them now and then with moderate waterings.

But where proper plants cannot be readily procured to plant in the above bed, let ſome good ſeeds be put in; the plants will ſoon come up, and produce fruit at a very acceptable ſeaſon.

In order to this, when the bed is made as above directed, mark out the holes for the ſeed about three feet and a half aſunder; make the holes in the form of a ſhallow baſon, about an inch and a half deep; and each of them about ten inches over.

In each of theſe holes put eight or nine good plump ſeeds, cover them about half an inch deep with earth, and put the hand or bell-glaſſes over them.

When the plants have been up about ten or twelve days, they muſt be thinned, leaving only four of the ſtrongeſt plants in each hole; drawing, at the ſame time, ſome earth about their ſhanks.

Theſe ſeeds, if ſown the firſt or ſecond week in May, and properly managed after they come up, will produce fruit fit for the table by the latter end of June.

Sow

Sow Cucumbers for Pickling.

The ſeeds intended to raiſe cucumbers for pickling ſhould be ſown in the natural ground, about the middle of the month; unleſs the ſeaſon be cold, or very wet, when it will be better to defer it till the laſt week in May, or the beginning of June.

Let a piece of rich open ground be prepared for theſe ſeeds, divided into beds three feet broad, and alleys of twelve inches broad between the beds. You may, if ground be wanting, plant rows of lettuces, ſavoys, or dwarf kidney-beans, between the beds.

When the beds are thus laid out, place marks for the holes exactly in the middle of the beds, three feet and a half aſunder. Dig the places where the holes are to be made, and break the earth well with the ſpade. This being done, form the holes, with the hand, like a ſhallow baſon, about an inch and a half deep, and ten inches over; ſowing in each hole eight or ten ſeeds, and covering them about half an inch deep with earth.

If the weather ſhould prove hot immediately after the ſeed is ſown, it will be neceſſary to ſprinkle the holes with a little water; but be ſure to let the ſprinkling be very moderate, for too much moiſture would rot the ſeed.

Remember to thin the plants when they have been up about a fortnight, leaving only five or ſix of the beſt and ſtrongeſt plants in each hole.

It is the common practice with gardeners, where room is wanted, to ſow the ſeed intended to raiſe cucumbers for pickling, between the rows of early cauliflowers, and other vegetables of that kind, allowing the ſame diſtance between the holes as above-mentioned; and as the cauliflowers will be gone by the time the cucumber plants begin to puſh out their runners, they will not be injured by them.

In cold wet ſeaſons, many of the gardeners near London ſow theſe ſeeds on a ſlight hot-bed, and remove the plants when they have been up about a week or ten days.

Their method is this:

They make a bed with new horſe-dung about a foot thick, adapting the breadth and length to the quantity of plants they intend to raiſe. This bed they cover with earth about three inches deep, drawing drills with their fingers acroſs the bed. In theſe drills the ſeed is ſown thick, and in cluſters, each conſiſting of eight or ten good ſeeds; and covered with earth about half an inch deep. The ſeeds in the cluſters almoſt touch one another, but a clear ſpace of about three inches is allowed between them: the drills are about two inches aſunder. The ſeed being thus ſown in patches, it will riſe in the ſame manner; and when the plants are fit to be removed, they are taken up in cluſters as they grow, with the earth, which will readily hang about their roots, and planted in the places where they are to produce their fruit; allotting one bunch of plants to a hole, and giving them immediately a little water. They will readily take root without flagging their leaves, and require no farther care, except a little water occaſionally in dry weather.

This is a very good method in bad ſeaſons, a very large number of plants may be raiſed by it, with a very little trouble.

Melons in Frames.

Your melon plants, whether under frames or bell-glaſſes, ſtill require particular attention.

Some of the moſt early plants in the frames will ſhew fruit in plenty, many of which will be ſet, and others ſwelling. All the aſſiſtance, therefore, in the power of art ſhould be given the plants, in order to procure a full crop of fruit.

A proper degree of heat in the beds, while the fruit is ſetting, and ſome time after, is a principal thing to be remembered; for a kindly warmth is as neceſſary to ſwell the fruit after they are ſet, as it was to encourage the plants to produce them at firſt.

In order therefore to keep up this kindly warmth, your beds ſhould be often examined; and whenever you perceive the heat to have declined conſiderably, let a freſh lining of well prepared hot dung be immediately applied to one or both ſides of the beds, as you ſee occaſion: for though there are often very warm days in this month, yet there are often cold nights; and, conſequently, it will be neceſſary to preſerve a due degree of heat in the beds, as many of the melons will otherwiſe turn yellow and fall off, and the reſt neither ſet nor ſwell kindly.

At the ſame time the plants in frames muſt be allowed a good quantity of freſh air every day when the weather is calm and mild. In order to this, the upper end of the lights muſt be raiſed with props, two, or three, or four fingers breadth high, in proportion to the warmth of the day; and ſhut down cloſe every evening about four or five o'clock. By this means the plants will be ſtrengthened, and the ſetting and free ſwelling of the fruit greatly promoted.

Remember alſo to cover the glaſſes every night with mats, during this month. When the air is cold, the mats ſhould be thrown over the glaſſes about five in the evening; but when warm, it will be ſoon enough to do this at ſix or ſeven.

When the morning is warm and ſunny, let the mats be removed by ſix; but if the weather be cloudy, ſeven will be ſoon enough.

You muſt likewiſe remember to water your melon plants in frames, for they will require a little now and then, when the weather is warm and ſunny. But let theſe waterings be always moderate, and not too often, for too much water would chill the young fruit, and prevent their ſettling. Once in ten days will therefore be often enough, and two pots of water ſufficient for a three-light frame.

Let always a moderate warm day be choſen for watering your plants, and let it be done about three or four o'clock in the afternoon. Remember to ſhut down the lights immediately after watering, and, if the ſun ſhines, throw a mat over the glaſſes, and let it continue there an hour or two.

In watering theſe plants, let as little as poſſible touch the fruit that are about ſetting, or newly ſet. The greater part of the water ſhould be applied towards the extreme parts of the bed; and a little only near the head, or main ſtem of the plant.

When the weather is very warm, you will find it of great advantage to ſhade the plants from the ſun, during two or three hours in the hotteſt part of the day. Thin mats ſhould be thrown over the glaſſes about eleven o'clock, and removed about two.

As the melons ſet, remember to place a piece of tile under each, to preſerve them from the damp of the earth in the bed.

It will alſo be neceſſary to raiſe the frame, whenever you perceive the plants too near the glaſſes. This is done by placing bricks, or ſquare pieces of wood under each corner of the frame: about ſix inches riſe will be ſufficient.

Melons under Hand and Bell Glaſſes.

You muſt finiſh the firſt or ſecond week in this month your ridges or beds for planting melons intended to be covered with hand or bell-glaſſes.

Theſe ridges muſt be made with new horſe dung, prepared as directed for making other hot beds in the two months preceding.

Let the ridges be at leaſt a yard broad, four feet will not be too much; and full two feet thick of dung, ſhaken in equally, and well beat down with the fork.

If you intend to make two or more of theſe ridges, let the interval or ſpace between them be four feet wide. Theſe ſpaces or alleys ſhould, in about a month or five weeks after, be filled with dung and earth; for this will greatly aſſiſt the ſetting of the fruit.

When your ridges are ready, cover them with rich earth, well broken with the ſpade, ten inches thick; mark out the holes for the plants, four feet diſtance from one another; and ſet a bell or hand glaſs over each, keeping the glaſſes cloſe down till the earth under them is warm.

The ridges being thus prepared, bring the plants; and if they are in pots, turn them carefully out, with the ball of earth entire; make a hole in the ground where each glaſs ſtood, and place in each hole one pot of plants, with the ball of earth entire. Cloſe the earth well about the ball, and alſo about the ſtems of the plants; pour about a quart of water into each hole, and put on the glaſſes.

During the firſt two or three days, the plants muſt be ſhaded from the ſun, from eight in the morning till about four in the afternoon; but after that time let them have more and more ſun every day, till they are able to bear it fully without flagging.

Remember to lift up the warmer ſide of the glaſſes every day, to give the plants freſh air; but ſhut them cloſe down every night; and during this month, cover them with mats.

If any of the melon plants have filled the glaſſes, let the vines have liberty, about the latter end of the month, to run from under them; but they muſt not be truſted out before that time.

In order to this let each glaſs be raiſed upon props about three inches and a half high, and the ends of the vines laid out, and pegged down, at regular diſtances from one another.

But remember to cover the ridges with mats every night for fourteen or fifteen days at leaſt, after they are laid out from the glaſſes.

Gourds and Pumpkins.

The gourds and pumpkins which were ſown on a hot-bed in April, ſhould be planted out about the middle of this month, provided the weather be warm.

Remember to plant the orange, and other ſmall gourds near a wall, or other fence, and when the plants begin to ſhoot, let their vines or runners be neatly trained, and faſtened up cloſe to the wall, pales, &c. By this means the plants, together with their fruit, will make a very agreeable appearance, during the month of July, Auguſt, and September.

If you have not the conveniecy of a wall, or other fence, you may ſupport theſe plants with ſticks, in the following manner: let a tall firm ſtake be fixed in the ground near each plant; and, in proportion as their vines advance in length, let them be trained up carefully round the ſtakes.

But pumpkins, and the larger kinds of gourds, ſhould be planted out in an open ſpot of ground, eight or ten feet from one another; for the vines of theſe ſorts muſt run upon the ground; and where there is room, they will extend themſelves to a very conſiderable diſtance.

Sow Gourds and Pumpkins.

It is not yet too late to ſow the ſeeds of gourds and pumpkins; but the ſooner it is done the better.

The ſeeds muſt be ſown in a hot-bed; a cucumber or melon bed already made, will anſwer the purpoſe. But if this cannot be ſpared, ſhake up two or three barrows of freſh horſe-dung into a bed about thirty inches ſquare; and cover it four or five inches thick with rich earth. Sow the ſeeds, and cover the bed with a large hand or bell glaſs.

As ſoon as the plants appear, let the ſunny ſide of the glaſs be raiſed a little every day with a prop, to give the plants freſh air; and let them be often refreſhed with water.

About the latter end of this month, or the beginning of June, the plants will have acquired rough leaves, near two inches broad, when they ſhould be planted out in the open ground, eight or ten feet from one another.

Kidney-Beans.

A full crop of kidney-beans ſhould now be planted, to ſucceed thoſe ſet in April.

The beſt and moſt profitable for this plantation are the ſpeckled, and the Canterbury white dwarf ſort; though any of the dwarf kinds will ſucceed.

They ſhould be planted in drills two feet and a half aſunder, and the beans laid two or three inches apart in the drills. Draw the earth evenly over them; and, when all are planted, let the ſurface of the ground be lightly and neatly raked.

Any of the running kinds of kidney-beans may alſo now be planted.

Theſe are all in general ſurpriſing bearers, and therefore very profitable for a family, eſpecially the ſcarlet flowering bean. There is likewiſe another kind, which differs in nothing from the ſcarlet, except in the colour of its flowers, which is white; but when fit to gather for the table cannot be diſtinguiſhed from the ſcarlet, either in taſte or manner of growth. Either of theſe, or any of the large white running kinds, are very proper for this plantation.

But you muſt remember that theſe, or any of the climbing kinds of kidney-beans, require more room to grow than the dwarf ſorts. The drills therefore for theſe ſhould be three feet and a half aſunder, the beans placed five or ſix inches apart in the drills, and covered equally with earth about an inch and a half deep.

As ſoon as the plants are come up, and begin to puſh their runners, let ſome tall ſticks or poles be placed to each row, for the plants to climb upon. The runners will ſoon take hold of the ſticks, and twine themſelves very naturally round them, to the height of

eight

eight or ten feet, provided the ſticks are of that height.

You will derive great advantage by planting theſe runners at this ſeaſon; for they will continue bearing till the cold weather deſtroys the plants.

But if you cannot procure the ſticks or poles, the dwarf kinds ſhould be planted; for the runners will not ſucceed without them.

Sow Lettuce Seed.

The ſeed of lettuce ſhould be ſown at two or three different times this month, that there may be a conſtant ſupply of theſe plants for the table.

The Coſs and Sileſia are the proper kinds to ſow now; though the brown Dutch may be ſown with ſucceſs, if required.

Remember to ſow the ſeeds in an open ſituation, and in a light, rich ſoil. Sow each ſort ſeparate, and rake in the ſeed with a light and even hand.

It will be neceſſary often to refreſh the beds where the ſeed is ſown, with water, eſpecially if the weather proves very dry; for otherwiſe the ſeed will not grow.

Tranſplant Lettuces.

The Coſs, Sileſia, and other kinds of lettuce ſown in the preceding month, ſhould be now tranſplanted.

In order to this, let a rich ſpot of ground, not too much expoſed to the ſun, be choſen for this purpoſe. Let it be dug about a ſpade deep, the ſurface raked very ſmooth, and the plants removed to it in the evening.

They muſt be planted in rows ten or twelve inches aſunder, and at the ſame diſtance between the plants. As ſoon as they are ſet, give them ſome water to ſettle the earth about their roots.

Small Salletting.

Let the ſeeds of creſſes, muſtard, radiſh, rape, and other ſmall ſallet herbs, be ſown often; every five or ſix days at leaſt, if a conſtant ſupply be wanted.

If the weather be hot and dry, theſe ſeeds muſt now be ſown in a ſhady border, where the ground is rich and light. Draw ſhallow drills for this purpoſe, ſow the ſeed in them tolerably thick, and cover them lightly with earth. Remember to let them have a little water every other day in dry weather.

Turnips.

Let more turnip ſeed be ſown now: the roots will come in a very acceptable ſeaſon; for they will be fit for the table by the middle or latter end of July, and continue good for a long time.

But remember not to ſow the ſeed in hot dry weather, for it will not then ſucceed. The proper time for ſowing turnips, and all ſmall ſeeds of that kind, is when the weather is ſhowery; for then there is no fear of its growing.

Let the ſeed be ſown equally pretty thick, and on an open ſpot of light ground. Take care alſo to rake it in lightly and regularly.

Thoſe turnips which were ſown the former month ſhould now be thinned regularly, allowing ſeven or eight inches between plant and plant; obſerving, at the ſame time, to cut up all the weeds.

Spinage.

It is not yet too late to ſow ſpinage, for it will yet ſucceed tolerably well, if ſown in an open ſituation.

And if a ſucceſſion of this plant be required, a little of the ſeed muſt be ſown every twelve or fourteen days.

With regard to the ſpinage ſown the preceding month, it muſt now be hoed and thinned, leaving the plants about five inches aſunder, and cutting down all the weeds under the ſurface.

Sow Carrots.

You may ſtill ſow carrot ſeed where it is required; it will grow freely, and the plants will appear ſoon, and be ready for the table by the latter end of July, or the beginning of Auguſt.

Dreſs the Beds of Carrots and Parſnips

The beds of carrots and parſnips ſown in the foregoing months, will now be advanced conſiderably in their growth, and ſhould therefore be properly encouraged.

Let them therefore be cleared from weeds, and the plants ſeparated to a proper diſtance from one another.

The ſmall hoe is the beſt and moſt expeditious inſtrument for this purpoſe; for it will not only effectually deſtroy the weeds, and ſuch plants as are thought improper to ſtand, but alſo greatly promote the growth of the remainder, by looſening the ſurface of the ground.

If you cannot uſe the ſmall hoe, the work muſt be done by hand, or the common hoe; for the plants muſt, at any rate, be thinned out to proper diſtances, that they may have room ſufficient to grow at the top, and ſwell at the bottom.

With regard to parſnips, they muſt not ſtand cloſer than ſix or ſeven inches from one another; for their roots will be both large and ſtraight, if they have room ſufficient to expand themſelves.

Nor is this leſs neceſſary with regard to carrots; but in thinning theſe plants, the time they are intended to continue in the ground is to be conſidered.

If they are intended to be drawn young for the table, they ſhould now be thinned out to four inches aſunder; but if they are to remain till they attain their full growth, ſix or ſeven inches every way will be neceſſary.

Management of Savoys and Cabbages.

Thoſe ſavoy and cabbage plants which are intended for winter uſe, muſt be now tranſplanted.

They may be ſet between rows of early cauliflowers, or between the wider rows of garden or kidney-beans, where room is wanting. But where there is ground unoccupied by other crops, it will be much the beſt method to plant out theſe in an open ſpot by themſelves.

Let the rows, in which they are planted, be two feet aſunder, and the plants ſet eighteen inches apart in the rows. Obſerve to plant them in moiſt weather, and to give each a little water immediately after planting.

The earth muſt now be drawn up about the ſtems of early and other cabbages. This work is abſolutely neceſſary, as it will greatly ſtrengthen them, and bring them forward amazingly in their growth.

About the latter end of the month, the early plants will begin to turn their leaves for cabbaging; they ſhould therefore be aſſiſted in this operation, by tying the leaves together.

In order to this let ſome ſtrong baſs, or ſmall withies be procured, and go over the plants row by row, tying ſuch as have begun to turn their leaves pretty much inwards. But in doing this, obſerve to gather the leaves of the plant up very regularly, and then tie them together with the baſs or withy; but not tie them too cloſe, for that will occaſion the plants to rot.

By this means the plants will be fit to uſe a fortnight at leaſt ſooner than they would be if left entirely to themſelves; at the ſame time they will be much whiter, and more tender in eating.

Sow Cauliflower Seed.

The cauliflower plants raiſed from ſeed ſown at this ſeaſon, will produce their flowers in October, and continue in great perfection the whole month of November; a ſeaſon when they will be very acceptable to moſt families.

But the ſeed ſhould not be ſown before the laſt week in this month; for otherwiſe the plants will flower too ſoon.

Let a bed of rich earth three feet wide, in an open ſituation, be prepared for this purpoſe. Let the ſeed be ſown equally, moderately thick, and lightly raked in with an even hand.

You ſhould remember to ſhade the bed every hot ſunny day, from ten to three o'clock, till the plants appear, and are all fairly come up; alſo to ſprinkle the bed often with water in dry weather.

Management of Cauliflower Plants.

Your beds of early cauliflowers muſt be often looked over carefully, about the middle and latter end of this month; for ſome of the plants will then begin to ſhew their flowers; and as ſoon as theſe appear they ſhould be ſcreened from the ſun and wet; for either of theſe would change their colour from a white to a yellow.

Remember therefore to break down three or four of the largeſt of the inner leaves over the flower, as ſoon as ever it appears in the heart of the plant.

This will anſwer the double purpoſe of ſhading the flower from the ſun, and defending it from wet. By this ſimple contrivance the flower will be preſerved in its natural whiteneſs, and at the ſame time be cloſe, firm, and beautiful.

Obſerve to water theſe plants frequently in dry weather; for this will cauſe the heads or flowers to grow to a larger ſize.

If you did not tranſplant the young cauliflowers raiſed this ſpring from ſeed, let that work be done now, and the ſooner in the month the better.

In order to this, let a piece of the richeſt ground be choſen for their reception, ſpread over it ſome good rotten dung, and dig the ground one ſpade deep, obſerving to bury the dung regularly as you proceed.

The plants muſt be ſet in this ſpot two feet, or two feet and a half aſunder every way. Remember to water them as ſoon at they are planted.

You may, if you pleaſe, ſow a crop of ſpinage on this piece of ground, between the cauliflower plants, without doing them any great injury.

Sow Broccoli.

The ſeeds for the principal crop of both the purple and white kinds of broccoli muſt be ſown this month.

It will indeed be prudent to ſow a little of the ſeed at two different times during the month; and if a conſtant ſupply be deſired, a little of both kinds ſhould be ſown during the firſt week, and the ſecond, or principal ſowing between the fifteenth and twenty-fifth of the month. For the plants raiſed from the firſt ſowing will, provided the weather be mild, be fit for the table by Chriſtmas, or a little after; while the ſecond, intended principally for ſpring uſe, will produce fine heads in February and March; and after the heads are gone, the ſtems will yield excellent ſprouts in great abundance.

Remember to ſow the ſeeds in a bed or border in an open ſituation, but not wholly expoſed to the rays of the ſun. Let each kind be ſown on a ſeparate ſpot, and the ſeeds raked in with an even hand.

Bore-cole.

Bore-cole, or, as it is often called Scotch-Kale, is a very uſeful plant, and well worth the little trouble that attends the raiſing of it. There are two ſorts of it, the brown and the green. The plants run up with very long ſtems, ſometimes three, four, or five feet high, and are ſo very hardy, that they will ſurvive the moſt ſevere winters; and in the months of February and March, their long ſtems will be loaded from the very bottom to the top with fine young ſhoots, which will boil and eat as tender as the beſt ſavoy.

The ſeed ſhould be ſown the firſt week in this month; but if you deſire the plants to grow very high, it will be better if ſown about the middle of April. But whatever time be choſen, let the ſeed be ſown on an open ſpot of good ground, and raked in lightly with an even hand. Remember to give the beds now and then a moderate watering in dry weather.

In about ſix weeks after the ſeed is ſown, the plants will be fit to plant out in the place where they are to remain.

Beans.

Let another crop of garden beans be now planted; the white bloſſom and long podded beans are the moſt proper for this ſeaſon.

If a conſtant ſucceſſion of young beans be deſired during the ſummer ſeaſon, it will be neceſſary to ſet a few at different times this month, viz. about the third, fifteenth, and twenty-ſeventh.

If you are deſirous of planting either the Windſor or Sandwich bean, let it be done at the beginning of the month, when either of theſe will often ſucceed tolerably well.

Peas.

Another crop of peas ſhould alſo be ſown now; and if a regular ſupply be wanted, let a few be ſown twice at leaſt in the month, if three times it will be the better, allowing about ten days between each ſowing.

The marrowfats will ſucceed very well, if ſown any time this month. The hotſpur kinds ſown at this ſeaſon, will ſometimes yield very good crops.

The dwarf kinds of peas generally ſucceed extremely well when ſown this month. Theſe ſeldom riſe above two or three feet high, but are excellent bearers.

The

The dwarf kinds ſhould be ſown in drills two feet aſunder, which will be room ſufficient for them.

The earth muſt now be drawn up about the ſtems of thoſe peas which were ſown in April; for this will add ſtrength to the plants, and greatly encreaſe their growth.

Stick Peas.

When the peas you intend to ſtick are about ſix or ſeven inches high, the ſticks muſt be added to the rows.

Remember to let your ſticks be of a height adapted to the different ſorts of peas; and be aſſured that thoſe which have ſticks to ſupport them, will yield more than double the quantity of thoſe which have none.

Radiſhes.

You may yet ſow radiſh ſeed where required; but you muſt remember to water the bed frequently in dry weather, both before and after the plants appear.

Thoſe radiſhes you intend for ſeed, muſt be tranſplanted when their roots are juſt in their prime, which will happen ſome time in the beginning of this month.

Let thoſe roots which are long, perfectly ſtraight, and whoſe tops are ſhort, be choſen for this purpoſe; and planted on an open ſpot of ground in rows two feet aſunder, and the plants eighteen inches apart in the rows. Remember to give a plentiful watering as ſoon as they are planted, to ſettle the earth about their roots.

Sow Celery.

Let the ſeed intended for a latter crop of celery be ſown the ſecond week in the month.

In order to this, let a bed of rich light earth be dug, and the ſurface laid perfectly level. When this is done, ſow the ſeeds pretty thick, and rake them lightly into the ground.

Remember to ſhade the bed from ten to three o'clock, till the plants appear; for the noon tide rays of the ſun would otherwiſe deſtroy the ſeed.

It will alſo be neceſſary to refreſh the bed frequently with water in dry weather. And by this method the plants will be fit to be planted in trenches in Auguſt and September; and ſoon after Chriſtmas fit for the table.

Prick out Celery

Prick out the plants of celery ſown in March from the ſeed beds, about the latter end of this month.

The bed intended for the reception of theſe plants muſt be three feet and a half broad, the earth well dug, and the ſurface laid ſmooth. When the bed is thus prepared, draw out ſome of the beſt plants from the ſeed-bed, and prick them into the other, three inches aſunder every way. Give them a gentle watering, and ſhade them from the ſun till they have taken root.

In this bed the plants are to remain till they have acquired a ſufficient degree of ſtrength, when they are to be tranſplanted into trenches, and there blanched for the table.

Sow Endive.

A little endive ſeed ſhould now be ſown for an early crop; and if a conſtant ſupply of this plant be wanted, a ſmall quantity ſhould be ſown at two different times this month; viz. about the middle and latter end.

The plants ariſing from the ſeed firſt ſown will not long continue fit for uſe, becauſe it will be apt to run to ſeed; but the plants from the ſecond ſowing will continue longer, and be fit for uſe at a very acceptable ſeaſon.

But whatever time be choſen, the ſeed ſhould be ſown pretty thick, on a ſpot of rich ground, and raked in lightly with an even hand.

Tranſplant Capſicums for Pickling.

The capſicums ſown on a hot-bed in March, ſhould be planted out in moiſt weather, about the latter end of this month.

In order to this, let a ſpot of rich ground be choſen, well dug, and the ſurface raked ſmooth and even. When the bed is thus prepared, take up the plants, and ſet them in rows a foot aſunder every way. Give them a gentle watering, and ſhade them from the ſun till they have taken root.

Tranſplant Love Apples for Soups, &c.

About the middle of this month is a proper time to remove the tomatos, or love apples, from the hot-bed in which they were raiſed.

As theſe plants are very luxuriant and rambling in their growth, they ſhould be planted cloſe to ſome wall, pale, or eſpalier; and when they begin to branch out, let them be nailed to the fence in the manner of a wall-tree.

Remember to plant them againſt a wall, &c. with a ſouth aſpect, for otherwiſe the fruit will not ripen. The vacant ſpaces between the wall-trees, will be ſufficient for this purpoſe.

One ſtout plant in a place is enough. Let them be watered as ſoon as planted, and ſhaded from the ſun till they have taken root. If you ſhelter them in cold nights for the firſt fortnight after they are tranſplanted, it will be of great advantage to their growth.

Dreſs Onion Beds.

The beds of onions ſhould be now perfectly cleared from weeds, and the plants thinned out to three or four inches aſunder. Remember to leave the ſtrongeſt plants for a crop.

Hamburg Parſley, Scorzonera, and Salſafy.

Your beds of Hamburg parſley, ſcorzonera, and ſalſafy, muſt now be carefully cleared, and the plants thinned or hoed out to ſix or ſeven inches diſtance from one another.

The ſeeds of the two latter ſhould now be ſown for winter crops: for they are very apt, when ſown early, to run to ſeed, before they are hardly fit for uſe. But thoſe ſown at this ſeaſon will not run up, but be in proper order for the table by Michaelmas.

Sow Pot-Herbs, &c.

You may ſtill ſow parſley-ſeed, where it was omitted in the former months; but it muſt be done in a ſhady ſituation, where the ſun has not too great power.

At the beginning of the month a little more purſlane ſeed ſhould be ſown, that the plants may ſucceed thoſe which were ſown in April.

In order to this, make choice of a ſpot of light rich earth in the open ground; break the clods well with the ſpade, and rake the ſurface very even. Then draw

ſhallow

ſhallow drills about ſix inches aſunder, ſow the ſeed pretty thick in the drills, and cover it with earth. Some ſow the ſeed on the ſurface, and rake it in lightly; either method will ſucceed, for the plants will grow freely.

If coriander be wanting, this is a proper ſeaſon for ſowing a little more of the ſeed. It ſhould be ſown in the ſame manner with the purſlane, in ſhallow drills ſix inches aſunder.

Chervil ſeed will ſtill grow; if theſe plants therefore be wanted, let a little of the ſeed be ſown in ſhallow drills, and covered lightly with earth.

Plant Mint.

You may ſtill make freſh beds of mint, provided it be done the firſt or ſecond week in the month; but after that time you will find it very difficult to find a ſufficient number of good plants.

The plants muſt be about ſix or ſeven inches long, drawn up carefully with their roots to them from the old buds, and planted on a ſpot of rich ground, in rows ſix inches aſunder, and the plants four inches apart in the rows. Remember to give them a plentiful watering as ſoon as planted, to ſettle the earth about their roots.

Plant Sage, Savory, Hyſſop, &c.

The ſlips or cuttings of ſage, ſavory, hyſſop, maſtich, roſemary, lavender, may now be planted; they will grow freely.

Let ſuch ſlips as have a ſufficient degree of ſtrength, and about five, ſix, or ſeven inches long, be choſen for this purpoſe: ſtrip off the leaves, if there be any, from the bottom; twiſt that part of the ſtalk a little, and ſet them about five or ſix inches apart, and about two thirds of them into the ground.

Remember to plant them in a ſhady ſituation, and to give them now and then a moderate watering in dry weather.

Deſtroy Weeds.

A more than common degree of care will now be neceſſary, with regard to deſtroying of weeds among the crops, in every part of the garden; for weeds are at no time more pernicious than at preſent. If they are ſuffered to grow too large, they will not only exhauſt the ground, and conſequently ſtarve the plants, but alſo render the whole garden very diſagreeable. Let it, therefore, be one of the principal works to deſtroy them.

Particularly, let your crops of onions, leeks, carrots, parſneps, lettuce, and other ſmall plants that grow pretty cloſe together, be cleaned from weeds, before they begin to ſpread, and over-top the plants, which they will ſoon do, when once they begin to run.

You ſhould alſo remember that the weeds, if ſuffered to grow large among the ſmall crops, will ſo mix and entangle themſelves, that the work of weeding will be rendered at once extremely tedious, and extremely troubleſome.

It will indeed be otherwiſe with regard to the weeds that appear between the rows of beans, peaſe, kidney-beans, cabbages, cauliflowers, and other crops planted in rows at a diſtance from one another; for their progreſs may then be ſtopped with the greateſt eaſe; becauſe the intervals are wide enough to admit a large hoe; and with the help of ſuch an inſtrument, a perſon may go over a large piece of ground in a little time. And ſurely a taſk ſo eaſily performed ſhould not be neglected, eſpecially when it is conſidered that it will prove of the greateſt advantage to the plants.

The NURSERY.

Propagate Evergreens, &c. by Layers.

This is a very proper ſeaſon for propagating ſuch evergreens, and other ſhrubs, by layers, as do not freely put out roots from any wood but the young ſhoots of the ſame ſummer's growth. The ſhoots of many ſhrubs of this kind will have a ſize proper for this purpoſe by the latter end of the month, and ſome of theſe ſhould therefore be then layed down.

In order to this, let ſome of the more pliant branches that afford the ſtrongeſt and beſt young ſhoots be brought down gently to the ground, and there firmly ſecured with hooked pegs. When this is done, let ſome of the young ſhoots be laid into the earth, and covered two or three inches deep with the mould, leaving about two or three inches of the top of each ſhoot out of the ground.

When they are thus laid in the ground, let a moderate watering be given them to ſettle the earth cloſely about the ſhoot, and repeated every five or ſix days in dry weather; but remember not to give them too much at one time, leſt it rot the tender fibres when they firſt ſhoot from the wood.

New Grafted and Budded Trees.

You muſt now look carefully over your new grafted and budded trees, looſening the bandages, and taking away all the clay, for there will be no further occaſion for it.

Remember not to let any ſhoots that riſe from the ſtocks below the grafts remain; but let them be rubbed off as ſoon as they appear, for they have no other tendency than to rob the graft of its nouriſhment. This care muſt be extended to the trees that were grafted the year before; for no ſhoots muſt be ſuffered to remain below the graft.

Water Seedling Plants.

If the weather prove dry at this ſeaſon, you muſt often refreſh the ſeed-beds of all young trees and ſhrubs, in general, with water.

But at the ſame time take care not to do it too haſtily, as the earth would by that means be waſhed away, and the tender roots of the plants would be burnt up by the rays of the ſun.

Three gentle waterings every week will be ſufficient, and prove highly advantageous to the plants.

Shade Seedling Plants.

Your ſeedling pines, cedars, cypreſſes, and other evergreens, ſhould now be ſhaded, in hot weather, from the noon-tide rays of the ſun, which will be now too powerful for them.

Water new Plantations.

If the weather proves dry, it will be neceſſary to water your ever-greens, and flowering ſhrubs, that were tranſplanted in March, once in five or ſix days, at leaſt once a week.

At

At the ſame time, let the mulch on the ſurface of the ground be continued over the roots of the more curious or tender kinds of theſe ſhrubs, for this will be of the utmoſt ſervice, in preventing the ſun from drawing away the moiſture from their roots.

Deſtroy Weeds.

Weeding is one of the moſt neceſſary works in the nurſery at this ſeaſon.

The ſeed-beds of all young trees and ſhrubs ſhould be now carefully weeded by hand.

Nor muſt the weeds be ſuffered to grow between the rows of your young trees or ſhrubs. This may indeed be eaſily prevented, by the frequent uſe of a large ſharp hoe; but remember to let it be done in dry days.

The FRUIT-GARDEN.

Wall and Eſpalier Trees.

Your apricot, peach, nectarine, plum, cherry, apple, and pear-trees, will make ſtrong and numerous ſhoots at this ſeaſon; theſe ſhould therefore now be properly regulated, and trained cloſe to the wall, before they become confuſed.

At the ſame time, let all uſeleſs and ill-placed ſhoots be taken away. All fore-right-ſhoots, or ſuch as are produced from the front of the brances, are of this kind; for they cannot, from the very nature of their ſituation, be properly trained in, and conſequently become uſeleſs.

But all ſide ſhoots of a moderate kind and growth, and well ſituated for laying in, muſt be left, and trained in a regular order, cloſe to the wall.

You ſhould be particularly careful to leave as many of the well-placed ſhoots of apricots, peaches, nectarines, and morella cherry-trees, as can be conveniently laid in; for theſe trees produce the principal part of their fruit upon thoſe ſhoots that are one year old; that is, thoſe which you lay in this ſummer, will bear fruit the next.

A ſufficient quantity therefore, of theſe ſhoots ſhould be now laid in, that a proper number of the beſt of them may be left in the winter-pruning, and the reſt taken away.

Remember that theſe ſhoots muſt be trained very regularly, at full length, and nailed as cloſe as poſſible to the wall, or eſpalier. They muſt not, on any conſideration, be ſhortened now, for that would cauſe them to produce, from their ſides, a number of ſmall uſeleſs ſhoots, which would weaken and hurt the principal ſhoots, by forming too cloſe a ſhade, ſo as to exclude the ſun and air from having that free acceſs to the fruit which is abſolutely neceſſary to its proper growth. For though a ſlight ſhade is abſolutely neceſſary to promote the growth of wall-fruit, yet too much of it is deſtructive.

At the ſame time, it muſt be obſerved, that this caution is not extended to thoſe parts of the wall, or eſpalier, that are vacant; for there ſome of the adjacent young ſhoots muſt now be ſhortened; for by this means they will put out ſide or lateral ſhoots, to ſupply the vacant parts.

Thin Apricots, Peaches, &c.

If you perceive the fruit on any of the apricot, peach, or nectarine trees too thick, let ſome of them be now taken away.

For it ſhould be obſerved, that theſe trees will ſometimes, in favourable ſeaſons, ſet three times more fruit than their roots are able to ſupply with nouriſhment; and if the whole, or even too many of them, were to be left, they would ſtarve one another, and the fruit, in general, would be ſmall and ill taſted.

Nor would the miſchief end with the ſeaſon, it would be extended to two or three ſucceeding years. For the trees, from the too great quantity of fruit, would not be able to produce ſhoots proper for bearing fruit the next year; and, at the ſame time, the trees would be ſo much exhauſted, that they would not recover ſtrength ſufficient to produce any proper wood before the ſecond year after; conſequently a tolerable crop could not be expected before the third year.

When therefore a tree is over-loaden with fruit, let them be now reduced to a moderate quantity; and the ſooner this is done the better it will be both for the tree and the remaining fruit.

Nor ſhould this thinning be performed in a careleſs manner; the branches ſhould be regularly looked over one by one, ſingling out the fruit you intend to leave on each branch before you take any away.

The moſt promiſing and beſt ſhaped fruit, provided they are properly ſituated on the branches, ſhould be left at ſuch diſtances, that each may have ſufficient room to ſwell, and grow freely to its full bigneſs, every way, without touching another; five or ſix inches will be ſufficient room for all the middling kinds of fruit.

At the ſame time, ſome regard ſhould be had to the ſtrength of the branches. Suppoſe, for inſtance, the bearing ſhoots, or branches, to be of three different ſizes, ſtrong, middling, and weakly; you may leave three of the faireſt and beſt placed fruit on the ſtrong, two upon the middling, and one only on the weaker branches.

If the above cautions, with regard to the diſtances between the fruit, and the nature of the branches, be obſerved in thinning the trees, they will doubtleſs bring each kind to its full perfection. At the ſame time the trees will ſhoot freely, and produce a ſufficient quantity of bearing wood for the ſucceeding year.

The ſmaller kinds of fruit, ſuch as the maſculine apricots, the nutmeg-peaches, and early nutmeg-peaches, may be left cloſer to one another, and a greater number of them ſuffered to remain on the branches.

Four or five of them, for inſtance, may be left on the ſtrong; three on the middling; and two on the weaker branches.

Vines.

At this ſeaſon your vines will ſhoot vigorouſly, and ſend out, beſides bearing, and other uſeful ſhoots, numbers of others that are altogether uſeleſs; theſe ſhould therefore be taken away, and the ſooner this is done the better.

Art will greatly aſſiſt nature, in ripening grapes in an unfavourable ſeaſon; and this is the time for employing it.

In order to this, the vines muſt now be perfectly cleared from all kinds of uſeleſs ſhoots; and, at the ſame

time, all the fruit-bearing branches, and other well-placed uſeful ſhoots, ſhould be nailed up regularly and cloſe to the wall.

This work ſhould be done before the ſhoots begin to entangle, or any way interfere with one another; for very great advantages attend this early dreſſing and regulating the vines; nor is there any other method of bringing the bunches of theſe fruit to any degree of perfection, but by timely nailing in the uſeful ſhoots, and clearing the vines of ſuch as are uſeleſs.

All the bearing ſhoots, that is, ſuch as have fruit upon them now, muſt be left, together with ſuch other ſhoots as have ſtrength, and are well ſituated for training, in order to produce fruit next year.

But all weak and ſtraggling ſhoots, ſuch as riſe immediately from the old wood, are uſeleſs, and muſt be taken away, wherever they are produced; and even ſtrong ſhoots that are deſtitue of fruit, and that riſe in places where they are not wanted, or not well placed for training in to produce fruit next year, ſhould be diſplaced.

When this is done, let all the bearing ſhoots, together with thoſe that are uſeful, and produced in proper places, be nailed, in regular order, cloſe to the wall. Remember not to ſtop any of the ſhoots now, but let each, for the preſent, be trained up at its full length.

The ſhoots muſt not be nailed up promiſcuouſly acroſs each other, as is often practiſed; but let every ſhoot be laid in ſtrait, and clear of another, in a regular manner, ſo that each ſhoot, and every branch of fruit, may equally enjoy the advantage of the ſun and free air.

After this, obſerve that all ſhoots that riſe in any part of the vines muſt be conſtantly rubbed off, as ſoon as they appear; let not, on any account, theſe ſmall ſhoots which commonly riſe from the ſides of the ſame ſummer's ſhoots now laid in, remain; but let theſe alſo be rubbed off, as ſoon as they begin to advance.

Vineyards.

The vines planted in the vineyard alſo require a very large ſhare of attention. All the ſhoots that have fruit upon them, and others that are ſtrong and well placed for the ſervice of another year, muſt now be trained up cloſe and regularly to the ſtakes.

At the ſame time, the vines muſt be cleared from all uſeleſs wood, and alſo from all ſuch ſhoots as are barren of fruit, or produced in ſuch places, that they cannot be trained for the ſervice of another year: let all theſe be rubbed off cloſe.

Remember to keep the ground between the vines clear from weeds; a caution neceſſary to be obſerved during the whole ſummer ſeaſon; for if weeds of any conſiderable ſize be ſuffered to grow near the vines, they will not only rob them of their nouriſhment, but alſo greatly retard the growth of the grapes, by keeping a continual chilly dampneſs about the vines. Let therefore the hoe be applied to them whenever they are found; but remember to do it in a dry day.

Examine the ſtakes that ſupport the vines; let them be firmly fixed, and in their proper places; and that all the fruitful ſhoots, and others that are well ſituated, be neatly and ſecurely faſtened to them.

Strawberry Plants in Bloſſom.

If the weather prove dry this month, the ſtrawberry plants, which will be now in full bloſſom, muſt be watered very frequently; thrice a week, at leaſt; and let the waterings be ſufficient to reach the roots of the plants. For if this neceſſary work be omitted, your crop of ſtrawberries will be very little, and thoſe that are produced ſmall and ill-taſted.

Examine new grafted and new budded Trees.

Let the trees of all ſorts grafted this ſpring be now examined; and wherever you find the graft and ſtock well united, take away both the clay and the bandage, for they will be then both uſeleſs.

At the ſame time examine the trees that were budded laſt ſummer, and take away all the ſhoots that riſe from the ſtock beſides the bud; for the ſtock ſhould have nothing to ſupply with nouriſhment but the bud, which will therefore ſhoot with more vigour.

Cleanſe the Fruit-Tree Borders.

Remember to keep the borders where wall and eſpalier fruit-trees grow very clean from weeds, for theſe exhauſt the nouriſhment, prove a harbour to ſlugs and inſects, and give the whole an unſightly appearance.

As ſoon, therefore, as any weeds appear, let them be eradicated, which will be eaſily done with a ſharp hoe; but let it be done in a dry ſunny day.

Deſtroy Snails, Inſects, &c.

Moſt of the wall fruits, eſpecially peaches, nectarines, apricots, &c. are very liable to be greatly injured by ſnails; let the trees therefore be looked over carefully in the morning and evening, the times when theſe vermin leave their holes to feed upon the fruit, when they may be eaſily deſtroyed.

If you perceive your wall-trees are annoyed with any kind of inſects, let them be deſtroyed as ſoon as perceived; for after they begin to attack any ſingle branch of a tree, they will ſoon over-run the whole, if not prevented. The beſt method of deſtroying them is this:

Take away all the leaves that are infected with them; that is, ſuch as are ſhrivelled or curled up; then ſtrew ſome tobacco duſt over all the branches and leaves, letting it remain there two or three days, and then waſh it off, by giving the trees a thorough watering all over their branches; for if the tobacco duſt was ſuffered to remain any longer, it would injure the trees.

A hand engine will be highly uſeful for watering wall-trees. For by the help of this a perſon may ſtand in the walks, and, with great eaſe and expedition, throw the water againſt any part of the trees, from the bottom to the top of the wall, even ſuppoſing it fifteen or twenty feet high; and this is by far the moſt eaſy, expeditious, and effectual method of watering theſe trees. For the force of the water will clear the leaves and branches from duſt, cob-webs, or any other filth they may have contracted; and if theſe waterings are repeated now and then, in very dry weather, no inſects can breed upon the trees.

Experience only can fully ſhew the great ſervice that wall-trees, in general, receive from being watered in this manner all over their branches, in dry hot weather.

Water

Water new Planted Trees.

Remember to refreſh your new planted trees, whether ſtandards or dwarfs, with water, once a week at leaſt, in dry weather; and let them ſometimes be watered all over their branches. If no mulch be laid on the ſurface of the ground over their roots, they ſhould be watered moderately twice a week, in dry weather.

The PLEASURE or FLOWER-GARDEN.

Sow Ten-Week-Stocks, &c.

You may ſtill during the firſt or ſecond week in this month ſow ten week-ſtocks, China aſter, and Indian pink.

A ſmall bed of rich light earth ſhould be prepared for them in the natural ground, where the plants will ſoon come up and grow freely, if often refreſhed with water, in dry weather, and ſheltered in cold nights with mats.

Sow the Seeds of hardy Annuals.

The ſeeds of ſeveral of the ſorts of annual plants, particularly lupines, ſweet ſultan, flos Adonis, white and purple candy-tuft, Lobel's catch-fly, dwarf lychnis, dwarf poppy, Virginia ſtock, Venus navelwort and Venus looking-glaſs, ſnails, caterpillars, dwarf annual ſun-flower, lavatera, oriental mallow, naſturtiums, convolvulus major and minor, Tangier and ſweet-ſcented peas, may be ſtill ſown in the borders with ſucceſs.

But remember to ſow them in ſmall patches, in the places where you would have them flower; for none of theſe ſorts ſucceed after being tranſplanted. Remember alſo to ſprinkle frequently with water the patches where they are ſown, in dry weather.

Sow Perennial Flower Seeds.

The ſeeds of ſtock july-flowers, ſweet-williams, columbines, carnations, pinks, ſcabiouſes, Canterbury-bells, pyramidal bell-flowers, holly-hocks, French honey-ſuckles, and ſome others, may ſtill be ſown with ſucceſs, provided it be done the firſt or ſecond week in the month.

Let a ſpot of light rich ground, not too much expoſed to the ſun, be choſen for theſe ſeeds; break the earth well as you dig it, and divide the bed into as many parts as you intend to ſow different kinds of ſeed.

When the bed is thus prepared and divided, let the ſeeds be ſown as equally as poſſible, and raked in with an even hand. Or, which perhaps is a better method, draw off about an inch deep of earth from the ſurface, with the back of the rake, into the alleys, and then ſcatter the ſeed equally on the bed. This being done, draw the earth that was turned off the bed, in an even manner over the ſeed, and lightly ſmooth the ſurface with a rake.

By purſuing this method the plants will come up ſtrong, and produce abundance of flowers next month.

Tranſplant Biennial and Perennial Flower-plants.

Moſt of the biennial and perennial flower-plants ſown in March will be fit for tranſplanting about the third week in the month; particularly the wall-flowers, ſtock july-flowers, columbines, ſweet-williams, ſingle ſcarlet lychnis, roſe campion, and catch-fly. Thoſe alſo which were ſown early in the ſpring, as Canterbury-bells, Greek valerian, tree-primroſe, fox-gloves, French honeyſuckles, and holly-hocks, may be tranſplanted about the latter end of this month.

But remember that they muſt be removed into nurſery beds, in order to get ſtrength, before they are planted out for good.

In order to this, let a ſpot of good clean ground be dug, raked very even, and divided into beds three feet and a half broad.

When this is done let the plants be ſet in rows, ſix inches every way from one another, and each ſort ſeparate. As ſoon as they are planted, let them be moderately watered to ſettle the earth about their roots.

In theſe nurſery beds they are to remain till September or October, when they muſt be planted out where they are to remain. They will flower, and make a very elegant appearance next ſummer.

Remove hardy Annual Plants.

The more hardy annual plants, as the African and French marigolds, chryſanthemums, marvel of Peru, China aſter, Indian pink, ten-week-ſtock, perſicarias, the common kinds of balſams, capſicums, and magnonette; purple amaranthuſes, ſcabiouſes, egg-plants, and love-apples, may, about the middle of the month, be removed into the natural ground.

Theſe will, if planted out into the beds, borders, and other parts of the flower-garden, make a very fine appearance about two months hence.

Remember to chuſe a ſhowery time for ſetting theſe flowers; for if this be done in dry hot weather, not one in ten of the plants would ſucceed; about four or five o'clock in the evening is the moſt proper time for planting them.

You ſhould alſo be careful when you ſet them to mix the different ſorts, ſo that there may be a variety of flowers in every part.

They ſhould be moderately watered as ſoon as planted, and the operation repeated every other evening till the plants have taken root.

Propagate Perennial Fibrous-rooted Plants.

The latter end of this month is a proper ſeaſon for propagating perennial fibrous-rooted plants by cuttings of the young flower-ſtalks. The double ſcarlet lychnis, lychnidea, double-rockets, ſtarwort, or the late flowering aſters, and many others of that kind, will ſucceed very well. The method is this:

Let ſome of the young flower-ſtalks be cut off cloſe, and divided into proper lengths, each length having three or four joints.

They muſt be planted in a ſhady border of light rich earth, about four inches aſunder, and two of the joints put into the ground, leaving the reſt above the ſurface. Cloſe the earth well about them, and give them a moderate watering.

Propagate double Wall-Flowers.

The only method of propagating the true double kinds of wall-flowers is by ſlips.

Theſe ſlips muſt have ſome ſtrength, and be from three to ſix inches long. Let theſe be ſlipped off carefully

from the mother plant in a moiſt or cloudy day; and the eaves from the bottom to ſomething more than half way up the ſlips taken away, ſo that there may be two or three inches of clear ſtalk.

Twiſt the ſtalks a little at the bottom, and plant them up to the leaves in a ſhady border, about four or five inches aſunder, giving them a moderate watering.

By the end of September they will be well rooted, provided they are often refreſhed with moderate waterings, in dry weather, when they may be taken up and planted in pots.

Carnations.

You ſhould now be careful to give your carnation plants in pots every aſſiſtance in the power of art, in order to encourage them to ſhoot vigorouſly.

Sticks ſhould be placed to ſupport the flower-ſtalks, which will now ſhoot apace, provided they were not placed there laſt month. Be ſure to let the ſticks be ſtraight, and of a ſufficient length. Thruſt them into the ground as cloſe as poſſible to the plant, and tie the flower-ſtalk neatly to them in different parts.

If you perceive any decayed leaves about the plant take them away, ſtir the ſurface of the mould a little, and add a ſprinkling of fine freſh earth over it; bind it cloſe up about the plants, and immediately give the whole a moderate watering.

If you are deſirous of having large and handſome flowers, all pods which riſe from the ſides of the ſtalks, ſhould now be taken off, leaving none but the top buds.

Remember to ſhade your pots from the mid-day ſun, and to water your plants every two or three days in dry weather.

Hyacinths, Tulips, &c.

Your beds of curious hyacinths, tulips, ranunculuſes, and anemonies, which are now in full bloom, muſt be defended from the mid-day ſun; and alſo ſheltered from heavy rains, by means of hoops and mats, as directed in the former month.

The mats ſhould be drawn over the hoops every day, when the ſun ſhines, about nine or ten in the morning, and removed about four or five in the afternoon.

By this means the flowers will be preſerved a conſiderable time in their full beauty; a fortnight at leaſt longer, than if they were fully expoſed to the ſun and heavy ſhowers of rain.

But remember to let your hoops be of a proper height; for otherwiſe the flower-ſtalks would be drawn up weak, and, in conſequence of that weakneſs, the colours of the flowers would be faint.

Autumnal flowering Bulbous Roots.

The leaves of ſuch bulbous roots as blow in autumn will now be withered, and when this happens they ſhould be taken out of the ground.

Remember to do this in dry weather, and to ſeparate the ſmall off-ſets from the main root. When this is done, ſpread the roots upon a mat in the ſhade to dry; after which they are to be put up till about the laſt week in July, and then replanted.

Auriculas.

The pots of your auricula plants ſhould, as the flowers fade, be immediately removed off the ſtand or ſtage, and placed upon a clean level ſpot where the plants can enjoy the morning ſun freely, till nine or ten o'clock, but no longer. In this ſituation they are to remain till Auguſt.

Remember to keep both the pots and ground where they ſtand perfectly free from weeds; and whenever any decayed leaves appear on any part of the plants, let them be taken away immediately, and the pots often refreſhed with water in dry weather.

Your tubs or boxes of ſeedling auriculas muſt now be removed to a ſhady place, if not done before: the place muſt be open to the morning ſun only.

They muſt be frequently ſprinkled with water in dry weather, and kept entirely free from weeds.

Climbing Annual Plants.

Your naſturtiums, convolvulus major, ſweet-ſcented and Tangier peas, and others of the climbing kind, will now require ſupport. Let ſticks therefore be placed for them to climb upon as ſoon as they begin to run.

Graſs and Gravel Walks.

You muſt now mow your lawns and graſs walks often, at leaſt once a week, if you intend to keep them in any tolerable order.

Your gravel walks ſhould be duly rolled, eſpecially after ſhowers of rain; for this will make the body of the walk firm, and render the ſurface very cloſe and ſmooth. If any weeds appear let them be immediately picked out, and no kind of litter ſeen upon them.

Deſtroy Weeds.

If you do not remember to deſtroy the weeds as ſoon as they appear, they will preſently get a head, for they now grow very faſt.

Let it therefore be a conſtant rule to cut them off as ſoon as they appear, either by the hand or hoe. If the latter be uſed, let it be done in dry weather, and the ground neatly raked after the operation, to draw the weeds and other litter from the ſurface.

J U N E.

Work to be done in the KITCHEN-GARDEN.

Cucumbers in Frames.

YOUR cucumber plants in frames muſt now be well ſupplied with water and freſh air.

In hot weather the plants ſhould be watered every two or three days; the beſt times for doing it, are about ſeven or eight o'clock in the morning, or four or five in the afternoon.

Let the lights be tilted up a conſiderable height every day, to give the plants a ſufficient quantity of freſh air; but it will be adviſable to ſhut the lights down every night, at leaſt till the latter end of the month.

About that time alſo it will be proper to raiſe the frame high enough to let the plants run out from under it.

Cucumbers

Cucumbers under Bell Glaſſes.

The cucumber plants under hand or bell-glaſſes, muſt now be ſuffered to run freely from under them.

Each glaſs ſhould therefore be raiſed upon three or four props, and the vines or runners of the plants be trained out with care and regularity.

They will alſo require a moderate watering three times a week in dry weather.

Pickling Cucumbers.

The cucumber plants ſown the latter end of laſt month in the natural ground for picklers, ſhould now be thinned. Remember to do it as ſoon as the rough leaf in the heart of the plants begins to appear.

Four at leaſt of the ſtrongeſt plants, but never more than five or ſix, ſhould be left in each hole; the reſt ſhould be carefully drawn out, and all the weeds on the whole ſpot cleared away.

The earth muſt be drawn up to the ſhanks of the remaining plants within a little of the ſeed leaves, and a light watering given to each hole to ſettle the earth. The plants after this will get ſtrength, and grow ſurprizingly.

Remember to refreſh them often with water; if the weather be very dry, let it be done every other day.

Sow Cucumbers.

You may ſtill ſow cucumber ſeed where required, at leaſt any time before the fifteenth of the month.

The plants from this ſowing will ſoon come up, begin bearing about the middle of Auguſt, and yield plenty of fruit during the remaining part of that month, and the greater part of September.

Melons in Frames.

You muſt ſtill ſhade, during the middle of the day when the ſun ſhines, the melon plants in frames.

This muſt be particularly remembered when the earth is but ſhallow upon the beds, or where the plants lie very near the glaſſes; for if they are in either of theſe caſes, expoſed to the full rays of the noontide ſun, the leaves will be ſcorched, and the juices of the vines, roots, and young fruit exhauſted. Even thoſe that have ſwelled to a tolerable ſize, would, for want of proper nouriſhment, be greatly checked, and become at once ſtunted and ill ſhaped.

Let therefore ſome thin mats be ſpread over the glaſſes every day when the ſun ſhines warm; but this need not be done before eleven o'clock; and the mats may be removed by two.

The thinner the mats uſed for this purpoſe are, the better, for the plants ſhould not be darkened by too full a ſhade; nothing more is required than to take off part of the ſun's rays, which will have the greateſt tendency to promote the growth of this fruit, whatever be the ſize.

Remember to give the plants a conſtant ſupply of freſh air every day, by tilting the lights at the back of the frame to a conſiderable height.

Frequent refreſhments of water will alſo be very ſerviceable to thoſe plants at this ſeaſon of the year, eſpecially if the beds where they grow have but a ſhallow depth of earth.

In that caſe the plants will, in hot weather, require to be moderately watered once a week; but care ſhould be taken in doing this, to give very little water near the ſtem or head of the plants.

But where the beds are twelve or fifteen inches thick, and the earth of a loamy conſiſtence, a very little water will be ſufficient.

Melons under Bell-glaſſes.

You muſt now give your melons under bell-glaſſes free liberty to run out.

In order to which each glaſs ſhould be raiſed and ſupported upon three props about two or three inches high; and the vines be laid out in a careful and regular manner.

It will be prudent to cover them every night with mats till about the middle or towards the latter end of the month, when the covering may be entirely laid aſide, unleſs the weather ſhould prove very wet; and in that caſe the plants ſhould be covered occaſionally.

For it ſhould be remembered that nothing is more prejudicial to theſe plants than too much wet; for this not only chills the young fruit, and prevents their ſetting and ſwelling, but alſo periſhes many of the roots of the plants.

When therefore the weather happens at any time to be very rainy, it will be proper to defend theſe plants as much as poſſible from it; and this may be done effectually by a covering of good thick mats, or canvaſs, ſupported by hoops fixed acroſs the bed.

Fill up the Alleys between the Melon Ridges.

It is now time to fill up the alleys between the melon ridges, that the roots of the plants may have ground ſufficient to extend themſelves.

Theſe alleys, if the beds are made wholly or a great part above the ground, muſt be filled up with dung, and covered with a proper thickneſs of earth.

If new hot dung was uſed for this purpoſe, it would be of great advantage, as it would throw a freſh heat into the beds, which would greatly promote the ſetting and ſwelling of the fruit.

The dung muſt be firſt laid in, and trod firmly down, raiſing it full as high as the dung of the beds; and then covering it with earth, till the interval be in a direct level with the ſurface of the beds.

Cauliflowers.

The cauliflowers ſown in May ſhould be pricked out into a nurſery bed of rich earth, about the latter end of this month.

In order to this, let a bed about three feet and a half broad, in an open ſituation, be prepared for their reception. Then prick in the plants about three inches aſunder, and give them a little water to ſettle the earth well about their roots; ſhade them from the ſun till they have taken root, and, if the weather be dry, give them a little water occaſionally.

In this bed the plants are to remain a month, in order to get ſtrength, when they are to be planted out for good in the place where they are to produce their flowers.

Remember to look over your plantations of early cauliflowers now and then, in order to break down ſome of the inner leaves over the young heads as they appear.

Turnips.

A full crop of turnips for uſe in autumn ſhould be ſown ſome time this month.

But

But let it be done, if poſſible, in a dripping time; or, at leaſt, when there is a proſpect of rain falling ſoon after. Remember to ſow the ſeed equally, and rake it in carefully with an even hand, as ſoon as ſown.

The crop of turnips ſown in May will now require hoeing, and the plants to be thinned in a regular manner.

You ſhould remember to begin this work as ſoon as the turnips have gotten rough leaves about an inch broad; for then the work may be done with expedition and regularity, and prove of the greateſt advantage to the growth of the plants.

Remember to leave the plants about eight inches from one another.

Carrots and Parſnips.

The crops of carrots and parſnips muſt now be cleared from weeds; and the plants, where they ſtand too thick, thinned out to proper diſtances, that their roots may have ſufficient room to grow. About ſix or eight inches diſtance between plant and plant will be ſufficent.

It ſhould be remembered, that the above diſtance is intended for thoſe roots which are deſigned to grow to their full ſize; for with regard to thoſe beds of carrots which are intended to be drawn while young, four or five inches will be a ſufficient diſtance between them.

Kidney-Beans.

Let another crop of kidney-beans be now planted, to ſucceed thoſe planted laſt month.

Either the dwarf or climbing kinds of kidney beans, may now be planted. But the running kinds ſhould be planted the firſt or ſecond week in the month; for they do not ſucceed ſo well if planted later.

The beſt ſorts for this purpoſe are the white Dutch, the ſcarlet bloſſom, and the large white kind; all theſe are exceeding good bearers, and equal to any for eating

Remember in planting any kinds of kidney beans to allow them ſufficient room; that is, let the drills for the running kinds be at leaſt three feet and a half, or four feet aſunder; and the diſtance between the drills for the dwarf kinds not leſs than two feet and a half.

If the ground be very dry at this ſeaſon, it will be proper to water the drills well before you put in the beans; for this will make them riſe much ſooner, and with more regularity.

Let the earth be drawn up to the ſtems of thoſe kidney-beans which were planted laſt month; this will ſtrengthen the plants, and aſſiſt them greatly in their growth.

Sticks ſhould alſo be placed to the running kinds of kidney-beans, which were planted at the beginning of laſt month. This ſhould indeed be done as ſoon as the plants ſend forth their runners, for they will then catch the ſticks readily.

Peas and Beans.

You may ſtill ſow peas, and plant beans, if the ſeaſon proves moiſt, but otherwiſe they will not ſucceed.

The ſmall kinds of beans are moſt proper for planting now; none better than the white-bloſſom and mazagan. Theſe will often yield plentiful crops at Michaelmas.

But the larger kinds of peas, as the marrow-fats, &c. will beſt anſwer your purpoſe; though a few of the beſt ſorts of hot-ſpurs ſhould be alſo ſown.

If the weather and ground be very dry, let both your peas and beans be ſoaked eight or ten hours in pond or river water; and then ſown or planted immediately.

Remember to allow ſufficient room between the rows; for the ſucceſs greatly depends upon that particular.

Savoys and Cabbages.

This is the proper ſeaſon for planting a full crop of ſavoys and cabbages for winter uſe.

The plants ſhould be ſet in rows, two feet aſunder, and eighteen or twenty inches apart from one another in the rows.

Some gardeners, where ground is very ſcarce and dear, ſet the ſavoy and cabbage plants between the rows of forward beans, early cauliflowers, and other crops of that kind, the rows of which are at a conſiderable diſtance from one another, and which will ſoon be off the ground. The plants will ſucceed by this method, nearly as well as if planted on a piece of freſh ground.

Broccoli.

The young broccoli plants ſown in May muſt now be pricked out from the ſeed bed.

In order to this, let a piece of good mellow ground be dug, and the ſurface well raked. In this bed let the plants be ſet, about three or four inches aſunder every way. Let them be watered immediately, and the operation repeated occaſionally in dry weather.

In this bed they are to remain a month or five weeks, and then be planted out for good.

More broccoli ſeed ſhould be ſown about the ſecond week in the month; and the plants from this ſowing, will produce good heads about the beginning of March.

Brown Cole.

The plants brown or bore-cole ſown in April or the beginning of laſt month, muſt be now pricked from the ſeed bed into a nurſery bed, at the diſtance of four inches aſunder every way. In this bed they are to remain till they have gathered ſtrength, which will be in about a month, when they are to be planted out where they are to remain.

Onions.

Remember to keep your onion beds free from weeds; and whenever you perceive the plants too thick, let them be properly thinned: they ſhould not ſtand nearer together than four or five inches.

But be careful in thinning your onions to leave the moſt promiſing plants behind, taking away thoſe which are ſmall and ſtunted.

Leeks.

About the third or fourth week in the month, your leeks will be grown to a proper ſize for tranſplanting.

Let therefore a piece of ground in an open ſituation be prepared for that purpoſe, and the plants ſet in rows eight inches aſunder, and about ſix inches from one another in the rows.

Celery.

The celery ſown early laſt month, will about the middle of this be fit for blanching.

In order to this, let a piece of rich ground, in an open ſituation be choſen; and there mark out the trenches by a line, about a foot wide, allowing an interval of three feet between the trenches.

Let each trench be dug about ſeven or eight inches deep, laying the earth taken out equally on each ſide; then lay very rotten dung about two or three inches thick at the bottom of each trench, and dig the bottom neatly, burying the dung equally three or four inches deep.

The trenches being thus prepared, ſet the plants in a ſingle row, exactly in the middle of the trench, about five inches aſunder. As ſoon as they are planted, give them a little water, and repeat the operation occaſionally till they have taken root.

In about a month or five weeks after the plants are ſet in the trenches, they will require to be earthed up, in order to render the ſtalks white and tender.

In order to this, the earth laid on the ſides of the trenches muſt be broken ſmall, and care taken to lay it gently to both ſides of the plants, and not to earth them too high at firſt, leſt you bury their hearts.

Remember to perform this work in dry weather, and, after you begin, to repeat it every fortnight or three weeks, till the plants are fit for the table.

Endive.

About the middle or towards the latter end of the month, ſome of the firſt ſown plants will be ready for blanching.

Let therefore an open ſpot of ground be dug one ſpade deep, and the ſurface raked ſmooth.

In this bed let the endive plants be ſet in rows about a foot aſunder every way, and ſome water given them immediately.

The main autumn crop of endive ſhould be ſown about the latter end of the month, in an open ſpot of ground, and the ſeed raked in equally with an even hand.

But if a conſtant ſupply of that vegetable be deſired, a little of the ſeed ſhould be ſown at two different times this month, in the ſame manner as mentioned above for the autumn crop.

Lettuces.

It is now time to remove your lettuce plants ſown in May from the ſeed-bed into an open ſpot of good ground.

But remember to do it in moiſt ſhowery weather, for they will not ſucceed in a dry ſeaſon; unleſs you plant them in drills about a foot from one another, and water them as ſoon as planted, repeating the operation frequently. For the drills will retain the water much longer than the level ground, and conſequently aſſiſt the plants in their growth.

You ſhould alſo ſow ſome Coſs, Sileſia, and brown Dutch lettuce ſeed to ſupply the table in Auguſt and September.

Creſſes, Muſtard, &c.

Let a little of the ſeed of creſſes, muſtard, and other ſmall ſalleting, be ſown every week at leaſt.

But remember to ſow it in the ſhade, and to refreſh the bed often with water in dry weather, both before and after the plants appear.

Mint, &c.

This is a proper ſeaſon for gathering mint, and other plants that are in flower, for drying or diſtillation.

Remember to do it in a dry day, and when firſt the plants begin to flower; for they are then in the greateſt perfection.

As ſoon as the plants are cut, let them be ſpread or hung up in ſmall bundles, in a light airy room, out of the reach of the ſun's rays, where they may dry gently. None of theſe muſt ever be laid in the ſun to dry; for the greater part of their virtues would by this means be exhauſted, and the plants rendered almoſt uſeleſs.

Pepper-mint for diſtilling ſhould alſo be cut this month, provided the plants are in flower; but if not, let them continue till the next.

Remember to cut them in a dry day, and to let the plants be dried in the ſhade.

Planting Pot-Herbs, and other Aromatic Plants.

Your young plants of thyme, ſavory, ſweet-marjoram, and hyſſop, will be ready to remove for the ſeed-bed about the latter end of the month, provided the weather be ſhowery.

Let therefore a piece of ground be dug for this purpoſe, the ſurface raked ſmooth, and divided into beds three feet and a half broad.

In theſe beds let the young plants be ſet by a line, about ſix or eight inches aſunder every way; and let them have a little water as ſoon as planted.

Burnet, borage, clary, marygold, and other herbs of that kind, ſown in the ſpring, ſhould now be planted out.

Slips or cuttings of thyme, ſavory, hyſſop, ſage, lavender, lavender cotton, rue, roſemary, and ſouthernwood, may ſtill be planted if required; for they will ſucceed in general, if planted in a ſhady ſituation, and now and then moderately watered.

Cardoons.

You muſt now remove your cardoons into the place where they are to blanch.

Remember to allow theſe plants a pretty deal of room, that they may be conveniently earthed up to a proper height.

In order to this, let a ſpot of the beſt ground, in an open ſituation, be choſen for them. In this ſpot plant the cardoons in rows a yard and a half aſunder, keeping the ſame diſtance between the plants in each row. Dig no trench, but plant them on the level ground, water them as ſoon as planted, and repeat the operation till they have taken root.

Watering in general.

All plants in general, which have been lately removed, ſhould be watered in dry weather, and the operation duly performed till they have taken root.

The NURSERY.

Inoculate Peaches, Apricots, and Nectarines.

You may begin, about the middle of this month, to inoculate apricots, and the early kind of peaches and nectarines.

Expe-

Experience has abundantly ſhown that the above trees generally ſucceed beſt when budded upon plum ſtocks. The ſtocks ſhould be raiſed from the ſtones; and when they are two or three years old, they will be of a ſize proper for budding.

Remember that the cuttings from whence the buds are to be taken be cut from healthy trees, ſuch as ſhoot moderately free, and of the ſame year's growth. This being obſerved, the operation is performed in the following manner:

Having provided yourſelf with proper cuttings, a ſufficient quantity of new baſs mat for bandages, and a ſharp penknife, with a flat ivory haſt ſomewhat taper, and quite thin at the end; make a croſs cut with your knife in the rind in the middle of the ſtock, remembering to make the cut no deeper than the bark; then from the middle of the croſs cut, let another be made downwards, about two inches in length, ſo that the two cuts together may form a T.

When this is done, take one of your cuttings or ſhoots and take off the bud as follows:

Begin at the lower or larger end of the ſhoot, and cut off all the leaves from it, but let the ſtalks of them continue; then about half an inch, or a little more below the ſaid eye or bud, make a croſs cut in the ſhoot, and placing your knife about the ſame diſtance above the eye, cut off the bud, together with part of the wood. Separate immediately that part of the wood which was taken off with the bud, by placing the point of your knife between the bark and the wood at one end, and pulling off the woody part, which will part readily from the bark. This being done, examine immediately the inſide of the bud to ſee if the eye be left; for if there appear a ſmall hole, the eye is gone with the wood, and therefore uſeleſs; but if there be no hole, the bud is good, and is to be immediately inſerted in the ſtock; obſerving, for the reception of the bud, to raiſe gently, with the haft of your knife, the bark of the ſtock downwards on each ſide, from the croſs cut, and directly thruſt the bud gently in between the bark and the wood, placing it as ſmooth as poſſible; and obſerving if the bud be too long for the inciſion in the bark of the ſtock, to ſhorten it ſo as to make it ſlip in readily, and lie perfectly cloſe in every part.

When the bud is thus fixed, let the ſtock in that part be immediately bound round with a ſtring of baſs mat, beginning a little below the cut, and proceeding upwards, drawing it cloſely round to the top; but be ſure to miſs the eye of the bud, bringing the tying cloſe to it both below and above, leaving only the very eye itſelf open.

About three weeks or a month after inoculation is performed, the bud will have taken with the ſtock, which may be known by the bud appearing plump, while thoſe which have not will look black, and be decayed. Let therefore the bandages of thoſe which have taken be looſened, that the ſap may have free courſe to the bud; for were the bandages ſuffered to remain as firſt tyed, they would pinch and ſpoil the buds. To prevent this, therefore, all the bandages ſhould be looſened in about three weeks, or a month at fartheſt after the operation.

Nothing more will be now neceſſary till the beginning of next March, when the head of the ſtock is to be cut off about a hand's breadth above the bud. The part above the bud is left to faſten the ſhoot to, which the bud makes next ſummer; for the buds never begin to ſhoot till the ſpring after budding. But the autumn following it ſhould be cut off cloſe, juſt above the bud, that the place of amputation may be the more readily barked over.

The general ſeaſon to bud or inoculate is from about the middle of June till about the ſame time in Auguſt, according to the forwardneſs of the different ſort of trees intended to be budded. This may be eaſily known by trying the buds; for when they will readily part from the wood, as already mentioned, it is then the proper ſeaſon for budding that kind of fruit.

You ſhould remember to perform this operation in moiſt cloudy weather, as the bud and ſtock being then more replete with juices than in hot dry weather, they will more readily unite.

Examine the Trees that were budded laſt Year.

The trees which were budded laſt year will now have made vigorous ſhoots, which muſt be ſupported.

In order to this, it will be proper to provide yourſelf with ſtakes about two feet long, driving one of them into the ground cloſe to the ſtock of each tree that has made a vigorous ſhoot, and tye the ſhoot to the ſtake at two different places. This will effectually prevent its being broken or ſeparated from the ſtock by the wind.

Look over your Grafted Trees.

Examine your grafts; and where you perceive they have made vigorous ſhoots, let them be ſupported by tying them to ſtakes driven into the ground near the ſtocks.

Propagate hardy Exotic Trees and Shrubs.

Layers may now be made from many of the hardy exotic trees and ſhrubs, eſpecially thoſe of the evergreen kind.

But you muſt remember that only the ſhoots of the ſame ſummer's growth are now to be layed. The operation is performed in the following manner:

Having fixed on the plant, let ſuch branches as are furniſhed well with young wood, be brought down gently to the ground, and there ſecured with hooked ſticks. This being done, let all the young ſhoots on each branch be laid, covering them two or three inches deep with earth; but leave at leaſt two or three inches of the top of each ſhoot out of the ground.

Remember to keep the earth about the layers moiſt, but not wet; and if this be duly obſerved, many of them will be well rooted by Michaelmas.

You may by this method of laying the young wood, propagate almoſt any trees or ſhrubs you deſire: but it is chiefly intended for the hard wooded kinds of evergreens, and others, which do not put out roots freely from older ſhoots or branches; but ſuch trees as ſhed their leaves, and even evergreens whoſe wood is ſoft, it is beſt, for the generality, not to lay them till after Michaelmas, or in February or March; chooſing at theſe times the laſt ſummer's ſhoots.

Tranſplant Pines and Firs.

Some of your young pines and firs raiſed this ſeaſon from ſeed, ſhould, about the laſt week in the month, be

be tranſplanted; but before that time they will be too tender to be removed.

In order to this, let ſome beds about three feet broad be prepared, and the young plants be pricked into theſe beds, about three inches aſunder every way; remembering to refreſh them with water as ſoon as tranſ planted.

It will be neceſſary to ſhade them from the mid-day ſun till they have taken root, which may eaſily be done by fixing hoops acroſs the bed, and throwing mats over the bed every ſunny day from ten in the morning till about three or four in the afternoon.

By this method the plants will ſoon take root, ſo that thoſe which were pricked out at this ſeaſon, will have acquired ſtrength ſufficient by Michaelmas, to enable them to endure the winter's cold much better than if they had remained in the ſeed-bed.

Shade Seedling Trees.

You muſt remember to ſhade the beds of ſome of your ſeedling exotic plants from the ſun in very hot weather, particularly thoſe of the ever-green kind.

They muſt not however be ſhaded too cloſe, or too long at a time, for that would draw the plants up weak, and make them too tender. It will be ſufficient if they are ſhaded from about eleven in the morning till two or three in the afternoon.

Water Seedling Trees.

All ſeedling trees and ſhrubs muſt be watered in dry weather, particularly young cedars, cypreſs, pines, firs, junipers, bays, hollies, evergreen oaks, arbutus, and indeed all other kinds of ever-green ſeedling plants.

But be very careful not to water them too haſtily, leſt you waſh away the earth from their roots, which are yet very ſmall and tender. Two or three moderate waterings in a week will be ſufficient, and the moſt proper time for it is in the evening.

Water new Planted Trees.

Such trees as were planted late in the ſpring ſhould be watered in dry weather, once every week during the whole month.

Remember alſo to keep ſome mulch upon the ſurface of the ground about your new planted trees; for this will not only ſave ſome trouble in the watering, by preſerving the moiſture longer in the earth, but alſo protect their roots from the drying winds and ſun; and conſequently enable them to ſhoot with more vigour.

When, therefore, you perceive the mulch laid ſome time ſince upon the roots of new planted trees to be much waſted, let freſh be added, particularly about the choiceſt plants, and ſuch as were planted late in the ſeaſon.

Weed the Seed-beds of Young Plants.

Remember to keep the ſeed-beds of young plants entirely free from weeds of every kind, for at this ſeaſon of the year they riſe as faſt as in April or May. No labour therefore ſhould be ſpared to deſtroy them before they grow large, eſpecially in the beds among the ſeedling plants; for there they will inevitably do the greateſt miſchief.

The FRUIT-GARDEN.

Apple, Pear, Plum, and Cherry-Trees.

Your apple, pear, plum, and cherry-trees, whether planted againſt walls or eſpaliers, will now have made ſtrong ſhoots, and therefore require regulating, provided it was not done in May.

Let therefore theſe trees be now cleared from all uſeleſs and unneceſſary ſhoots; let them be taken off cloſe.

But remember to leave, at moderate diſtances, in every part of the tree, ſome of the beſt grown and well-placed ſhoots; for in all probability ſome of theſe will be wanted to lay in and ſupply ſome place or other of the tree in the winter pruning. And whenever there appears an abſolute want of wood, in any part of theſe trees, leave, if poſſible, ſome good ſhoots in theſe parts.

When all the uſeleſs ſhoots are taken away, let the remaining ſhoots be nailed, or otherwiſe faſtened up cloſe to the wall or eſpalier, and each ſhoot at its full length.

Apricot, Peach, and Nectarine-Trees.

If any of your apricot, peach, or nectarine-trees were not put in order laſt month, it muſt be done now, and the ſooner the better. For where theſe trees are ſuffered to remain long in the wild confuſed manner they naturally grow into at this ſeaſon, it will prove injurious to the trees themſelves, and greatly retard the growth and ripening of the fruit.

Let therefore theſe wall-trees be gone over as ſoon as poſſible, clearing away all the ill-grown and ill-placed ſhoots: remember to take them off cloſe to the place where they are produced.

At the ſame time be ſure to leave in every part of theſe trees, a ſufficient quantity of the beſt ſhoots for bearing next year; that is, leave all the regular and moderately growing ſhoots, provided they can be conveniently trained in, faſtening them cloſe to the wall in a neat manner.

Remember not to ſhorten any of the ſhoots for the reaſons given laſt month, but lay them in, whether large or ſmall, at full length; taking care to train them in ſuch a manner, that their leaves may afford a moderate ſhade, in hot ſunny days, to the fruit; for all kind of wall-fruit thrive beſt under a ſlight cover of leaves. At the ſame time the leaves will alſo prove a ſhelter to the fruit from the cold air of the night.

Thin Wall-Fruit.

If the fruit on any of your apricot, peach, or nectarine trees were not thinned laſt month, let it now be done as ſoon as poſſible; obſerving the ſame method in doing it, as mentioned laſt month.

Vines.

Let your vines planted againſt walls be now looked over and regulated, unleſs the work was done laſt month.

If this be not done at the beginning of the month, it will be impoſſible to procure, at a proper ſeaſon, large and well ripened grapes. For where the vines are ſuffered to run into diſorder, the bunches will be ſmall and irregular, and the grapes ſmall and ill-taſted.

Let ſuch of the vines therefore, which were not regulated in May, be now regulated with all expedition; clearing away all uſeleſs ſhoots, and nailing all that are uſeful cloſe to the wall in a neat and regular manner.

When this is done, let thoſe vines which were looked over and regulated in May, be now again looked over; clearing away all ſhoots in general that have been produced ſince laſt month. Be ſure to rub off thoſe ſmall ſhoots which riſe from the ſides of the ſame ſummer ſhoots.

Vineyards.

The vines planted in vineyards will now require a conſiderable ſhare of attendance, to prevent their running into confuſion; and in preventing this confuſion the whole ſucceſs depends.

Let therefore the bearing ſtocks be trained to the ſtakes with ſome degree of regularity; ſo that every ſhoot may equally enjoy the benefit of the ſun and free air. At the ſame time let all weak and ſtraggling ſhoots be diſplaced, together with thoſe which cannot be trained to the ſtakes in proper order.

It will be alſo very neceſſary to deſtroy the weeds whenever they grow in the vineyard; for this will be of the utmoſt advantage to the growth and timely ripening of the grapes.

New Planted Trees.

Let ſuch fruit-trees as were planted laſt autumn, winter, or ſpring, particularly ſtandard-trees, be now examined. See that they be well ſecured, ſo that they cannot be rocked about by the wind, which would diſturb their roots.

At the ſame time take care to keep the earth well cloſed about the ſtems of new planted trees, that neither the ſun or wind may have acceſs that way to dry the earth near the roots.

The apricot, peach, and nectarine trees which were headed down in the ſpring, ſhould alſo now be looked over. They will have made ſtrong ſhoots, which ſhould now be nailled to the wall, to ſecure them from the power of the wind.

Budding or Inoculating.

About the third or fourth week in this month, you may begin inoculating the early kinds of apricots, peaches, and nectarines.

But remember to perform the operation in cloudy weather, if poſſible; but if no ſuch weather happen, let it be done in the morning or evening.

Plum ſtocks raiſed from ſtones, are the moſt proper for budding the above fruit upon; the ſtocks ſhould be about two or three years old.

If the tree be intended for a dwarf, or for the wall, let the bud be inſerted in the ſtock about ſix inches above the ground; but if the tree be intended for a ſtandard, three or four feet above the earth will not be too much. But whatever height be allowed the ſtock, remember to make the inciſion for receiving the bud in a ſmooth part of the ſtock.

We have already explained the manner of performing this operation in the work of the nurſery for the preſent month, and therefore ſhall not repeat it here.

Plant Strawberries.

If new plantations of ſtrawberries are wanting, you may provide plants for that purpoſe about the middle or latter end of the month.

Let theſe plants be taken from ſuch ſtrawberry-beds as bear well, and produce large fruit. From theſe beds chooſe a parcel of the ſtrongeſt plants, and take them up carefully with their roots, which you are to trim a little, and cut off the ſtrings from the heads of the plants.

When this is done, let them be immediately planted into a nurſery-bed, prepared for them in a ſhady ſituation, about three or four inches aſunder, giving them a moderate watering to ſettle the earth about their roots.

In this nurſery-bed they are to remain till September or October, when they will have gathered ſufficient ſtrength, and be in excellent order to be removed into the bed where they are to remain; but they muſt then be planted a foot aſunder every way.

This method is not uſually practiſed, though much better than the common; becauſe the plants will be much ſtronger by September, than any that can then be procured from the old beds.

Water Old Strawberry-beds.

You muſt remember to water your ſtrawberry-beds in dry weather, every two or three days from the beginning till about the middle of the month; for about that time the principal crop of moſt kinds of ſtrawberries will be ſetting their fruit, and ſwelling to their reſpective ſizes; and while the fruit are growing, they ſhould be encouraged by keeping the earth in the beds always in a middling degree of moiſture: you will ſoon be convinced that you have not taken this trouble in vain by the ſize, as well as by the quantity and quality of the fruit.

Deſtroy Snails, &c.

Be very careful to look over your fruit-trees, particularly your apricot, peach, and nectarine trees, for ſnails every morning and evening, and eſpecially after ſhowers of rain; for at theſe times the ſnails leave their retreats, to feed upon the fruit.

The PLEASURE or FLOWER-GARDEN.

Carnations.

You muſt now be very careful of your choice carnations; for towards the latter end of this month, they will begin to break their pods for flowering.

Art will be neceſſary to give them one of their principal beauties, that of opening regularly. Let therefore the inner cup or flower pod be cut open a little way in ſeveral places, in order to aſſiſt the opening and ſpreading of the petals, or flower-leaves.

This operation ſhould be performed juſt as the flower begins to break the pod. A ſmall pair of pointed ſciſſars will be very proper for this purpoſe. With theſe let the pod be cut a little way down, from each notch or indenting at the top. But be very careful not to cut the pod too deep at firſt; but rather open it a little at each place; and in a day or two after cut it down a little farther, if the former be not found ſufficient.

You muſt however remember in performing this operation, to leave ſo much of the bottom of the pod entire, as will anſwer the purpoſe of keeping all the petals or flower-leaves regularly together.

If you omitted to place your carnations in pots upon the ſtage in May, let it be done now; but you muſt not

not cover the top of the ſtage till the flowers are opened; and then the cover muſt be conſtantly kept on, to defend them from the fierce rays of the ſun, and from heavy rains.

Remember to water them three times a week at leaſt; that is, you ſhould repeat the operation whenever you perceive the ſurface of the earth in the pots to appear dry; for it ſhould always be kept in a middling degree of moiſture.

It will be alſo neceſſary, as the flower-ſtalks of theſe plants riſe in height, to tye them up to the ſticks. They ſhould be tyed in ſeveral places, bringing the ſtalk to touch the ſtick: but do not tye it too ſtraight.

Tranſplant Carnation and Pink Seedlings.

About the middle of the month, your carnation and pinks raiſed this year from ſeed, will be fit to tranſplant from the ſeed-bed into the nurſery.

In order to this, let a bed or two of good earth, three feet and a half broad, be prepared, by breaking the clods well, and raking the ſurface even.

When the beds are thus prepared, take up your plants carefully, and ſet in each bed ſix rows of plants, by means of a line, ſix inches from each other in the row. As ſoon as they are planted, let a gentle watering be given them; and the operation be repeated once every two days at leaſt, in dry weather, till they have taken root.

In this bed they are to remain ten or twelve weeks, when they muſt be removed into another, and planted a foot aſunder every way.

Remember when they flower, which will be next year, to examine them very attentively, eſpecially the carnations, for there will certainly be found among the whole ſome new and very good flowers; and theſe are to be then increaſed by layers, according to the general method.

Method of laying Carnations, Pinks, and double Sweet-Williams.

About the middle of this month ſome of your carnations will be fit for laying, which is done in the following manner:

Provide ſome rich earth in a barrow or baſket, a ſharpe penknife, and a ſufficient number of ſmall hooked pegs.

When theſe things are in readineſs, clear away all the weeds and other litter found about the plants; ſtir the ſurface of the earth a little, and lay thereon as much of the freſh earth as will raiſe the ſurface round the plant to a ſufficient height, ſo as readily to receive the ſhoots or layers.

This being done, pull off the leaves from the lower part of the ſhoot; letting thoſe which grow upon the head of it remain, after cutting off about two inches of their tops. Then fix upon a joint about the middle of the ſhoot, and placing the knife on the under ſide of it, ſlit the ſhoot from that joint, rather more than half way up towards the next above.

When you have proceeded thus far, make an opening in the earth, and lay the ſhoot immediately, ſecuring it there with one of the hooked ſticks. Remember to raiſe the ſhoot gently up, ſo as to make the head of it ſtand as upright as poſſible, and ſee that the ſlit be open. Then cover up the body with more of the ſame mould; and in that manner proceed till they all are layed.

But remember, as ſoon as all the ſhoots belonging to one plant are layed, to give them a gentle watering, which will ſettle the earth regularly about all the layers. The waterings muſt be repeated in dry weather; but let them always be moderate, otherwiſe there will be great danger of diſturbing, or waſhing away the earth from the layers.

Theſe layers, in about ſix weeks time, will be finely rooted, and muſt then be taken off from the old roots, and planted, ſome of the beſt into ſmall pots, and the reſt into nurſery-beds, where they are to remain till October; at which time they may be taken up with balls of earth about their roots, and planted in the borders.

Method of Propagating Carnations and Pinks by Cuttings.

Beſides the above method of increaſing carnations and pinks, eſpecially the latter, there is another, which the gardeners call pipeing. It is performed in the following manner:

About the middle or latter end of this month, the plants will have made proper ſhoots for this operation. Let therefore the upper parts of the ſhoots intended for this purpoſe be taken off; and if the cutting, or, as the gardiners call it, the pipeing, hath two points when taken off, it is ſufficient: ſome take them off with a knife, cutting them cloſe above a joint; but it is much better to take them off with the hand only; the method is this: Take the head of the ſhoot between the ends of the fingers and thumb of the right hand, holding the lower part of the ſhoot with the left; then pulling the head of the ſhoot gently, it will readily part and come out of its ſocket, about the third joint from the top.

Having by this means procured a ſufficient quantity of ſhoots, let their tops be trimmed pretty ſhort, and if the bottom of the cutting appear ragged, let that be cut even; and having prepared a bed, or pots, of light rich earth, broken very fine, and the ſurface made very ſmooth, take the cuttings, one by one, between your fingers and thumb, and thruſt them gently near half way into the earth, putting them about an inch, or an inch and half, diſtant from one another.

Remember, in planting, to make no hole to receive the cutting, but only thruſt the end gently into the earth; for it will make way for itſelf; and, as ſoon as a quantity is planted, to give them a gentle watering.

It will be neceſſary to ſhade them from the ſun, from nine in the morning till about five or ſix in the evening. And if theſe cuttings can be conveniently covered with glaſſes, it will prove of the greateſt advantage; they will then take root freely, and be fit for tranſplanting a fortnight or three weeks ſooner than if they were fully expoſed to the open air.

But however that be, remember to refreſh them frequently with water, ſo as to keep the earth about them a little moiſt.

Tranſplant Chryſanthemums, French and African Marygolds, &c.

You may now, when the weather is ſhowery, tranſplant chryſanthemums, French and African marygolds, perſicarias, tree and purple amaranthuſes, ſcabiouſes, egg-plants, ſtramonium, palma Chriſti, love-apple, to-

bacco plants, marvel of Peru, balſams, capſicums, China aſters, Indian pinks, ten-week ſtocks, the large convolvulus, and ſeveral others.

In order to this, let them be carefully taken up with balls, or, at leaſt, with as much earth as will readily hang about their roots; and in that manner let them be planted in the beds, borders, or other parts of the garden. Remember, when you plant them, to cloſe the earth well about their roots and ſtems, and immediately to give every plant a little water, repeating it occaſionally till they have all fairly taken root.

As they advance in height, let the larger kinds be properly ſupported with ſticks; for great part of the beauty of theſe flowers conſiſts in their having fair and upright ſtems; they muſt therefore be properly trained and ſupported.

Tender Annuals.

You muſt often refreſh your tender annuals, ſuch as cockſcombs, tricolars, globes, double balſams, double ſtramoniums, &c. with water. They will require it three times a week at leaſt; but let it always be moderate.

They muſt alſo be allowed a large quantity of freſh air every day, which muſt be given them by tilting up the lights with props, or ſliding them a little way open.

Thoſe balſams, cockſcombs, tricolars, &c. which are grown to any tolerable ſize, and are pretty ſtrong, may, about the laſt week of this month, be brought into the open air; but thoſe which are ſmall and weakly, ſhould remain under the glaſſes a week or two longer.

Propagate Fibrous-rooted Plants.

This is a proper ſeaſon for propagating perennial fibrous-rooted plants, which is done by ſetting the flower ſtalks.

The double ſweet-williams, double ſcarlet lychnis, lychnideas, and ſeveral other ſorts of perennial plants of that tribe, may be increaſed by this method, which is performed in the following manner:

Let ſome of the ſtouteſt flower ſtems be cut off cloſe to the head of the plant, and theſe cuttings divided into lengths, each containing two or three joints.

Your cuttings being thus prepared, plant them about four inches aſunder in a ſhady border; remember to put two joints of the cuttings into the ground, and to give them immediately a little water.

If you cover theſe cuttings with hand-glaſſes, it will greatly aſſiſt them in taking root.

Tranſplant Autumnal Flowering Bulbs.

All thoſe bulbous and tuberous-rooted plants which grow in autumn, may now be taken up and tranſplanted; particularly colchicums, autumnal crocuſſes, hyacinths, narciſſuſſes, and other autumnal flowering plants of this kind, whoſe leaves are now decayed.

Remember, when you take up the roots, to remove all the off-ſets. After which, they may be either planted again immediately, or kept out of the ground till the firſt or ſecond week in Auguſt. But if they are not planted at that ſeaſon, they will not blow in autumn with any degree of ſtrength.

The leaves of your calcamens will be alſo now decayed; let the roots therefore be taken up, parted, and planted again in freſh mould. They generally flower in February or March, according to their ſituation.

Tranſplant Seedling Plants.

Your wall-flowers, ſtock july-flowers, ſweet-williams, and columbines, ſown in March or April, ſhould be now tranſplanted into nurſery beds about ſix inches aſunder, and have a good watering given them, to ſettle the earth about their roots.

In this bed the plants are to remain till about Michaelmas, and then removed into the borders, &c. where they are intended to remain. Their flowers will make an elegant appearance next ſummer.

Hollyhocks, tree-primroſe, fox-gloves, pyramidal campanulas, Canterbury-bells, Greek valerian, ſingle roſe campion, rockets, ſcarlet lychnis, and other perennial plants ſown in the ſpring, ſhould be now tranſplanted into nurſery beds about ſix inches apart.

In theſe beds they are to remain till they become ſtrong and handſome plants, which will be about September or October, when they are to be taken up and planted out, where they are to remain to flower.

And if they are judiciouſly placed in different parts of the garden, they will make a very elegant appearance next ſummer, when they will all flower.

Take up the Roots of Tulips, Jonquils, Crown Imperials, &c.

Some time this month the leaves of your tulips, jonquils, &c. will begin to decay; and when this happens, it is a proper time to take the roots out of the ground.

Remember to do this in dry weather, and to ſpread them thinly upon mats, laid in the ſhade, to dry, as ſoon as they are taken out of the ground.

As ſoon as they are thoroughly dry, and ſomewhat hardened, let them be very well cleaned, and all the off-ſets ſeparated from the large roots. When this is done, let them be put up, each ſort by itſelf, in bags or boxes, till September, October, or November, when they are to be all re-planted.

By this method of taking up the choiceſt bulbous roots of any kind, as ſoon as their leaves decay, they are prevented from exhauſting themſelves too much, which many ſorts would do, were they permitted to remain in the earth; becauſe they would ſoon put out new fibres, and conſequently ſet all the roots a growing at an unſeaſonable time of the year.

Beſides, it is neceſſary to take up all kinds of bulbous roots once every year, in order to ſeparate the ſmall off-ſets from each of the principal; particularly tulips, jonquils, hyacinths, and others of the choicer kinds of bulbs; and there is no time ſo proper to take them up, as when the leaves and flower ſtalks of the different kinds begin to decay; for then the roots are in a ſtate of reſt; but if permitted to remain three weeks or a month after that period, they will put out freſh fibres, and the root would begin to form the bud for the next year's bloom; and if they were then to be taken up, would, in ſome meaſure, check the next year's flower; that is, it would not blow ſo large as it would, had it been taken up immediately at the decay of the leaves.

Guernſey Lilly Roots.

The leaves of the Guernſey and Belladona lilly roots will be now decayed, and conſequently it is a proper ſeaſon to take up the roots.

As ſoon as they are taken up, and the off-ſets taken from them, they ſhould be planted ſingly in beds of earth

earth newly dug, or in pots filled with new compoſt; for this will greatly encourage them to ſhoot, and conſequently encreaſe the largeneſs and beauty of their flowers.

Ranunculus and Anemone Roots.

As the leaves of the ranunculus and anemone roots will now begin to wither, they ſhould be taken up.

But a conſiderable deal of care is neceſſary in taking theſe roots out of the ground; and it ſhould always be done in a dry day, when the ground is pretty dry.

When the roots are taken up, they ſhould be dried in the ſhade, and preſerved in a dry place till the ſeaſon for planting them arrives.

Hyacinth Roots.

As ſoon as the hyacinths are paſt flowering, and their leaves begin to decay, let the roots be taken up, at leaſt all thoſe of the fine double kind.

As ſoon as theſe roots are taken up, they ſhould be immediately committed to the ground again, though in a different manner: they muſt be laid ſide-ways into a bed of light earth, covering the roots, but leaving the ſtalks and leaves out of the ground.

In this bed the roots are to lie for ſome time, in order to ſwell and harden, which they will do ſufficiently by the time the ſtalks and leaves are perfectly decayed.

The method of preparing the bed, and laying the roots, is this:

Let a bed of light earth be dug one ſpade deep. When this is done, rake the earth up from each ſide of the bed towards the middle, ſo as to form an eaſy rounding kind of ridge from one end to the other of the bed.

In this ridge of earth the roots are to be laid, obſerving that they are not now to be placed with their bottoms downward; but each root muſt be laid fairly on its ſide, with the ſtalks and leaves hanging out.

In the above poſition, let them be laid in two or three rows on each ſide of the ridge; placing the roots about two inches aſunder in the rows, and covering the roots equally with earth.

When the roots have laid in this bed about twenty days, they will be fully ſwelled, and thoroughly ripened; when they muſt be taken out of the ground in a dry day, well cleaned, and then ſpread upon a mat in a dry ſhady place. In about ten or twelve days after this, they muſt be put up into boxes till September or October.

Auricula Plants.

If you omitted laſt month to place any of your auricula plants growing in pots in a ſhady ſituation, let it be done now.

But remember to water the pots frequently in dry weather, and to keep both the pots and the place where they ſtand, free from weeds.

Support and Trim Flowering Plants.

You ſhould be very careful to ſee that every one of your tall growing plants be properly ſupported with ſticks. For nothing gives plants a better appearance than their ſtanding firmly in their places, and their being trained neatly with ſtraight and upright ſtems.

At the ſame viſit your plants, trimming ſuch as ſtand in need of it.

All ſtraggling, broken, and decayed ſhoots, together with all ragged or decayed leaves, ſhould be taken away.

Cut down the flower-ſtems of ſuch perennial plants as are paſt flowering. But, in doing this, remember to let the ſtems be cut off cloſe to the head of the plant; and, at the ſame time, to clear the plant from all dead leaves. Unleſs you intend to ſave the ſeeds; for then it will be neceſſary to leave, for that purpoſe, ſome of the principal flower-ſtems, cutting off all ſuch as are weak and ſtraggling.

Management of Evergreens and Flowering Shrubs.

Examine your clumps or quarters of evergreens and flowering ſhrubs; and wherever you find any of them to have made any diſorderly ſhoots, let them be reduced to order, either by ſhortening them, or cutting them off cloſe.

At the ſame time, remember to keep the whole exceeding neat, and free from weeds.

Cut Box Edgings.

About the middle of this month is a proper ſeaſon for cutting box edgings, provided the weather be moiſt; for it ſhould never be done in dry weather.

Theſe edgings ſhould never be ſuffered to grow above three inches high, nor more than two broad. Remember to cut them very neat and even.

Clear the Borders from Weeds.

Be very careful to keep your borders free from weeds, and all kinds of litter. For if you permit the weeds to remain on any of the borders, eſpecially thoſe near walks, they will give the whole a very unſightly appearance. If the hoe be uſed for this purpoſe, let it be done in a dry day; and after the weeds are cut up clean below the ſurface of the ground, let the whole border be neatly raked.

Mow Graſs-Walks and Lawns.

As ſoon as ever you perceive the graſs to be grown of an unſightly length, let the walks and lawns be mown. They will, in general, require this labour once a week, which will keep them in tolerable good order.

At the ſame time, the edges of graſs-walks and lawns ſhould be kept cut very cloſe; for this will add greatly to their neatneſs and beauty.

Gravel Walks.

You ſhould alſo remember to keep your gravel-walks extremely neat and clean at this ſeaſon.

The principal walks ſhould be rolled at leaſt twice a week, with an iron or ſtone roller. The former is much the beſt, as it will be drawn with more eaſe, and render the ſurface of the gravel ſmoother than any other.

JULY.

Work to be done in the KITCHEN GARDEN.

Cucumbers.

YOUR cucumber plants will now demand attention, particularly thoſe which are planted under-hand or bell-glaſſes.

They will now be in full bearing, and therefore muſt be well ſupplied with water in dry weather.——They ſhould have a moderate watering once every other day.

If this be complied with, and the beds kept entirely free from weeds, the plants will continue to bear handſome and well-taſted fruit till the middle of September.

Cucumbers for Pickling.

The cucumber plants ſown in the natural ground for picklers will alſo require ſome care.

You muſt remember to lay out their vines in regular order, as they begin to advance: and if the ground between the holes of theſe plants was not dug laſt month, let it be done now; and as you proceed in the digging, let the vines be laid out in a neat manner, at regular diſtances. At the ſame time, let ſome earth be laid between the plants, preſſing it down gently, in order to part, and make them ſpread different ways, according as you would have them run. Remember alſo to draw the earth up round each hole, in order to form a baſon for holding the water given them in dry weather; for they will require frequent waterings.

Melons.

The melon plants, whoſe fruit are now beginning to ripen, will require particular regard.

Very little water muſt now be given theſe plants, for too much moiſture would ſpoil the fine taſte of the melons. They muſt, however, in very dry and hot weather, be moderately watered now and then. But regard muſt always be had to the nature of the earth, and its depth upon the beds. Where there is a conſiderable depth of good loam, we mean twelve or fourteen inches, the plants ſhould not, when their fruit is full grown, be allowed any more water; for good loam, where it is of a tolerable depth, will retain a moderate and proper degree of moiſture for a long time.

But ſuch melons which grow in common light earth, and where there is, at the ſame time, but a moderate depth of it upon the beds, the plants will, in very hot weather, ſtill require water; but then it muſt be done with moderation, and not repeated above once a week.

Protect Melons from heavy Rains.

If the weather ſhould be very wet at this ſeaſon, which ſometimes happens, your melon plants muſt be occaſionally protected.

This may be done without any difficulty, where the plants grow under frames; but it will be different with regard to thoſe planted out under hand or bell-glaſſes. All poſſible means muſt, however, be uſed to ſhelter them, when the weather happens to be uncommonly wet; for theſe plants will be now full of fruit.

In order to this, let the fruit, at leaſt as many of them as are ſwelled, be put under their own bell-glaſſes; or, where there are any ſpare glaſſes, let them be placed over the fruit.

Another method is to place hoops over the ridges or beds, about ſixteen or eighteen inches from one another; and when it rains very hard, let ſome large and thick mats be drawn over the hoops; or, which will be ſtill better, pieces of painted canvas.

But whatever covering be uſed, remember that it is not to remain any longer than juſt to defend the plants from heavy rains; for a free circulation of air will be now abſolutely neceſſary.

Savoys and Cabbages

Let a ſpot of good ground, in an open ſituation, be now prepared for a principal crop of ſavoys, and winter cabbages.

As ſoon as the ground is dug and raked, let the plants be ſet at eighteen or twenty inches aſunder every way.

Brocoli.

You muſt now remove your broccoli plants intended for a full crop into the place where they are to remain.

Let a piece of the beſt ground be choſen for this purpoſe, and the plants ſet in rows two feet aſunder, and about twenty inches apart in the rows. Give them a little water as ſoon as they are planted; and if the weather ſhould prove dry, let the waterings be repeated once every two or three days, till the plants have all taken root.

But theſe plants ſhould, if poſſible, be planted out in a ſhowery time, which will prove an advantage to the plants, and alſo ſave conſiderable trouble in the watering.

You ſhould now ſow a little brocoli-ſeed for the laſt time this ſeaſon: it ſhould be done before the end of the ſecond week in the month.

In order to this, let a rich ſpot of ground, where the ſun has not too much power, be choſen; and after the ſeed is ſown, let the bed be often ſprinkled with water, in dry weather; for this will both aſſiſt the plants in their ſpringing and growth.

About the latter end of Auguſt, the plants ſown now, will be ready to plant out for good, and produce heads in April, or the beginning of May.

Cauliflowers.

You muſt now plant out the cauliflower plants ſown in May for the autumnal crop, where they are to remain.

Remember to chuſe a ſhowery time for this work; and to plant them in rows two feet aſunder every way. Let them be watered as ſoon as planted, and the watering

ing frequently repeated, in dry weather, till they have taken root.

Kidney-Beans.

Kidney-beans, either of the dwarf or running kind, may now be planted for a late crop.

But remember to let the ſeeds be in the ground before the end of the firſt week in the month; otherwiſe they will not ſucceed. You ſhould alſo remember to plant them where they may be ſheltered from the nipping morning froſts, which too often happen in September; for this crop will continue bearing, if the weather continues any thing mild, till October.

The following caution likewiſe ſhould be obſerved in planting theſe beans.

If the weather, at the time of planting, be very hot, and the ground very dry, it will be proper to ſoak the beans in rain, river, or pond water, about ſix or ſeven hours before they are ſet. But remember to plant them as ſoon as ever they are taken out of the water. The drills alſo ſhould be watered before the beans are dropped into them.

This ſoaking of the beans is only neceſſary when the weather is very hot, and the ground very dry; for, at other times, it will be better to let the drills only be watered, and the beans immediately planted.

Sow Onions.

The laſt week in this month, but not before, you may ſow onions to ſtand the winter.

Let therefore a rich ſpot of ground, in a ſheltered ſituation, be dug, and divided into beds three feet and a half, or four feet broad. Sow the ſeed immediately, tolerably thick, and rake it in. The plants will ſoon come up, and gather ſtrength ſufficient by Michaelmas, to enable them to reſiſt the cold of the winter. They will be fit for ſallads, and other purpoſes, in March and April.

Remember when the plants are come up to let them be weeded in time; for, otherwiſe, the weeds, which will riſe with the onions, will ſoon get the ſtart of them, and deſtroy the whole crop.

Sow Turnips.

Turnips for autumn and winter uſe may be ſown any time this month. But, if poſſible, let it be ſown in a ſhowery time, for a little rain will now be of the utmoſt advantage to the ſeed.

Remember not to ſow the ſeeds too thick, but as regularly as poſſible; the ſame care will alſo be neceſſary in raking in the ſeed; let it be done lightly, and with an even hand.

Thoſe turnips which were ſown in June muſt now be hoed; but let this be done in dry weather; at the ſame time cut down all the weeds, and thin out the plants to ſeven or eight inches diſtance.

Sow Winter Spinage.

The beſt ſorts of ſpinage for ſowing at this ſeaſon, are the prickly-ſeeded kinds; theſe being more hardy than the other ſorts, and conſequently better able to endure the cold of the winter.

Near the latter end of the month, let a clean well ſituated ſpot be neatly dug; and as ſoon as the ground is ready, let the ſeed be ſown. Remember not to ſow it too thick, but as equal as poſſible; and to rake it in with an even hand. Some tread the ground as ſoon as the ſeed is ſown, and then rake the ſurface ſmooth and even. Either method will ſucceed, and perhaps almoſt equally.

Sow Turnep-rooted Radiſhes.

There are two ſorts of the turnip-rooted radiſh, the one black, and the other white, and are generally called the black and white Spaniſh radiſh.

Between the tenth and twenty-fourth of this month, will be a very proper time for ſowing the ſeeds of either. But remember to chuſe an open ſpot of of ground for this purpoſe.

Soon after the plants are come up, they ſhould be hoed out to five inches diſtance, that their roots may have room to ſwell. They will be ready to draw for the table about Michaelmas, and will continue good, eſpecially the black ſort, till Chriſtmas, unleſs the froſt be very ſevere; in which caſe they ſhould be drawn out of the earth, and preſerved in ſand.

Sow common Radiſhes.

If theſe plants are wanted, as in ſome families they are, ſome of the ſeed may be ſown the laſt week in this month, but not before. The plants will ſoon come up, and be ready to draw for the table by the firſt or ſecond week in September.

Sow Cole-worts.

This is the very beſt ſeaſon in the whole year for ſowing cole-worts. They are very uſeful in families, as they will ſupply the table in the ſpring, when the ſavoys and other greens of that kind are over.

But remember not to ſow this ſeed before the twenty-fourth of the month, when an open ſpot of rich ground ſhould be prepared fot its reception, and divided into beds four feet wide. In thoſe beds let the ſeed be ſown moderately thick, and raked in lightly with an even hand.

In about a week after ſowing, the plants will come up, and by the middle of September be ſtrong enough to be tranſplanted; when they are to be ſet in rows a foot aſunder, and eight inches apart in the rows.

Sow Endive.

You may now ſow ſome endive for the principal winter crop. But it muſt be ſown the firſt week in the month, or it will not ſucceed.

Let the ſeed be ſown tolerably thin, in a rich open ſpot of ground, and lightly raked in with an even hand.

Remember to water the bed frequently in dry weather; for this will be of great ſervice in bringing up the plants ſoon, and alſo in cauſing them to riſe regularly.

Sow Small Salletting.

Creſſes, muſtard, radiſh, and other ſmall ſallad herbs, may now be ſown if required.

But remember to ſow the ſeeds, each ſort ſeparate, in ſhady border, in ſhallow drills. If the weather be dry, there will be a neceſſity for daily watering the bed, or the plants will not riſe regularly.

If a conſtant ſupply of theſe ſmall ſalleting herbs be wanting, a little of the ſeed ſhould be ſown once every week.

Sow Carrots.

A little carrot-ſeed may be ſown the firſt or ſecond week in the month, in order to raiſe ſome young carrots for the table in autumn; about Michaelmas they will be fit to draw, and continue very fine all October and November.

Sow Lettuce.

The Coſs, Sileſia, or Dutch lettuce are moſt proper to be ſown at this ſeaſon.

About the firſt or ſecond week in the month, let a ſpot of rich ground be dug, and the ſeed ſown on it immediately. The plants will be fit for the table in the beginning of September.

And if a little more ſeed be ſown on another ſpot of ground the laſt week in the month, a regular ſupply of lettuce will be continued till November, if the weather be favourable.

Tranſplant Endive.

A parcel of the ſtrongeſt endive plants muſt be now removed to ſupply the table in autumn.

But you muſt remember that endive requires a good ſoil, well dug, and the ſurface ſufficiently raked.

As ſoon as a ſpot of ground is thus prepared, let your plants be ſet in it, a foot diſtant from each other every way. They muſt be watered as ſoon as planted; and the waterings repeated every other day in dry weather, till the plants have taken root.

Tranſplant Celery.

You muſt now prepare your trenches for planting out a good crop of celery.

In order to this let an open ſpot of rich ground be choſen, and well cleared from weeds. When this is done, mark out the trenches about a foot broad, allowing an interval of three feet and a half between the trenches. Let each trench be dug about a ſpade deep, and the earth that comes out laid neatly in the interval between the trenches, remembering to ſpread it as even as poſſible.

When this is done, let ſome good rotten dung be laid at the bottom of the trench, and dug in.

This being performed, chooſe a ſufficient number of the ſtrongeſt of your plants, trim the ends of their roots, and cut off about two inches of the tops of their leaves, and then plant them in the trenches.

Remember that one row only muſt be planted in each trench, and that this row be directly in the middle of it. Four or five inches will be a ſufficient diſtance between plant and plant; but ſome water muſt be given them immediately, and the waterings repeated occaſionally in dry weather, till the plants have taken root.

Tranſplant Lettuces.

The Coſs, Sileſia, common cabbage, and brown Dutch lettuces, ſown laſt month, ſhould now be tranſplanted.

In order to this let a ſpot of the richeſt ground be choſen, well dunged, and the ſurface raked very even.

When the ground is ready, put in the plants by a line, at the diſtance of twelve inches from one another.

Give them a little water as ſoon as they are planted, and repeat the operation occaſionally, till they have all taken root.

Tranſplant Leeks.

You ſhould make choice of a good piece of ground for tranſplanting your leeks, as that will prove of the utmoſt advantage to the plants, eſpecially if a little rotten dung be ſpread on the ſurface and dug in.

When the ground is properly prepared, let it be divided into beds four feet broad. Then take up your leeks, chooſing the ſtrongeſt plants, and trim their roots and tops of their leaves. When this is done, let them be planted in rows, ſix inches apart every way.

Artichokes.

Your artichoke plants, which will now ſoon come into uſe, muſt be ordered in the following manner:

If you deſire to have large artichokes, you muſt, in order to encourage the main head, cut off all the ſuckers or ſmall heads which are produced from the ſides of the ſtems; and theſe in ſome families are dreſſed for the table.

You muſt alſo remember, that as ſoon as the principal head or artichoke is cut, let the ſtem be immediately broken down cloſe to the ground. This practice is indeed too often diſregarded; but this is utterly wrong; for the ſtems, if permitted to remain, would greatly impoveriſh the roots, and injure them much more than is generally imagined.

Plant Sage, Hyſſop, &c.

You may ſtill plant the ſlips of ſage, hyſſop, winter ſavory, and other herbs of that kind, for they will yet ſucceed.

The ſlips muſt be about ſix or ſeven inches long, planted in a ſhady border, and often refreſhed with water in dry weather.

Remember to chuſe ſuch ſlips as have ſtrength, and to put them two thirds of their length, at leaſt, into the earth.

Pull Onions.

About the latter end of this month, examine your forwardeſt crops of onions; and when their leaves begin to wither, it is a proper time to take the roots out of the ground.

It is not indeed very common that theſe roots are fit to be taken up this month; but when they are, let them be managed in the following manner:

Take them up in dry weather; and as you take them out of the earth, pull off their leaves, four or five inches of the ſtalk only being to be left to each onion. As ſoon as they are taken up, let them be ſpread to harden upon a clean, dry, ſpot of ground; and let them lay there twelve or fourteen days, remembering to turn them once every two or three days at leaſt, that they may dry and harden regularly.

When theſe have laid their proper time, they muſt be gathered up in a dry day, well cleared from earth and all looſe outer ſkins, and carried into the houſe, where they muſt be ſpread thin upon the floor of a dry airy room.

Remember to keep the windows of the room conſtantly open in dry weather, for about a week or ten days after the onions are houſed; but after that time no more air ſhould be admitted through the windows; nothing then being wanting but to turn them now and then, picking out all the decayed roots.

Pull Garlick and Shallots.

When the leaves of your garlick and ſhallots begin to wither, it is time to take the roots out of the ground. This will happen to the moſt forward plants ſome time this month, when they ſhould be taken up, and dried in the ſhade, nearly in the ſame manner as above directed for onions.

Gather Seeds.

As your ſeeds ripen, let them be gathered; but remember to do it in very dry weather.

As ſoon as the pods, or ſeed-veſſels are cut from the ſtalk, let them be ſpread immediately in a dry place, where a free current of air may be admitted to them. In this ſituation let them lie a fortnight or three weeks; when they may be beaten out of their pods, and preſerved in bags or boxes for uſe.

Gather Herbs for Drying.

Baum, mint, hyſſop, winter ſavory, thyme, &c. ſhould be gathered, in order to be dried for winter uſe, ſome time this month.

But remember to let this be done when the plants are in flower; for then they are in their higheſt perfection. Remember alſo to cut them in dry weather, and to ſpread or hang them up in ſmall bundles, in a dry airy place, ſhaded from the ſun. In this ſituation let them remain and dry gently; for they muſt never be dried in the ſun.

Gather Herbs to diſtil.

Many of the herbs proper for diſtillation will be now in flower, and conſequently proper to be cut for diſtillation. It will perhaps be unneceſſary to mention, that they ſhould be cut in a dry day; unleſs they are intended to be diſtilled by what is called a cold ſtill, when they ſhould be gathered in the morning with the dew about them.

Gather Chamomile Flowers.

About the latter end of this month, ſome of your chamomile flowers, together with thoſe of marigold and lavender, will be fit to be gathered.

But remember to do it in a dry day, and to ſpread them out thinly to dry in a ſhady place. When they are ſufficiently dry, put them up in paper bags for uſe.

Clear the Ground from Stalks, Weeds, &c.

As many of your plants will now have done bearing, let the ground be cleared from their leaves, weeds, or any other kind of rubbiſh.

Pull up alſo the ſtalks and haulm of cauliflowers, beans, peas, &c. as are paſt bearing; together with other plants that are paſt ſervice, and clear them entirely off the ground.

When this is done the ground will have a neat appearance, and be in a proper condition to be dug, for receiving an autumn or winter's crop.

Nor is the elegance of the appearance all the advantage that will flow from this trouble; the ground will be in much better condition to receive the intended crops than if the ſtalks, haulm, weeds, and other rubbiſh, had been ſuffered to continue; for they would have exhauſted a very conſiderable part of its ſubſtance.

The NURSERY.

Bud Apricots, Peaches, and Nectarines.

This is the principal ſeaſon for budding apricots, peaches, and nectarines; but remember to do it upon plum-ſtocks, which are the beſt adapted to theſe kinds of fruit. Theſe ſtocks ſhould be raiſed by ſowing the ſtones of plums; and they will be fit for budding in the third year of their growth.

With regard to the manner of performing the operation of budding, we have fully deſcribed it in the work of the nurſery of the foregoing month.

Bud Plums, Pears, Cherries, &c.

Plums, pears, cherries, &c. may alſo now be budded on their proper ſtocks. Plums, for inſtance, ſucceed beſt when budded on plum-ſtocks, raiſed by ſowing the ſtones; pears when budded upon quince or pear-ſtocks, raiſed by ſowing the kernels; and cherries when budded on cherry-ſtocks, raiſed from ſowing the ſtones.

In performing this operation, regard muſt be had to the nature of the intended tree. If it be deſigned for a wall or eſpalier, the budding ſhould be performed in a ſmooth part of the ſtock, about five or ſix inches above the ground; becauſe the tree will then readily furniſh the wall or eſpalier with bearing wood from the very bottom.

But if it be intended for a ſtandard, the budding ſhould be performed conſiderably higher, three, four, or even ſix feet from the ground. You muſt alſo remember to chooſe ſtocks that are grown to a proper ſize; otherwiſe they will not have ſubſtance ſufficient for receiving the buds at a ſufficient height from the ground.

Bud Jaſmines.

The budding of jaſmines is the moſt certain method of raiſing the more curious kinds; and this is the proper ſeaſon for performing the operation.

The common white jaſmine is the proper ſtock to bud the more curious kinds upon; and it ſhould be done the firſt or ſecond week in the month.

Examine new Grafted and new Budded Trees.

Look over all your new grafted trees, and diſplace all ſuch ſhoots as are at any time produced from the ſtocks below the graft, or bud; for theſe would rob the latter of their nouriſhment.

At the ſame time obſerve, where any of the grafts or buds have made vigorous ſhoots, to let every one of theſe ſhoots be ſupported with a firm ſtake.

Tranſplant Seedling Firs and Pines.

Whenever you find your young firs or pines ſtand too cloſe in their ſeed-beds, let them be tranſplanted now. For though they will now require a little more care than when tranſplanted next ſpring; yet they will ſucceed very well, provided they are properly watered and ſhaded from the ſun.

Let therefore beds be prepared, about three feet broad, the ground well broken, and the ſurface raked very even. Into theſe beds let the plants where they ſtand too thick in their ſeed-beds be tranſplanted, and watered immediately.

Remember to ſhade the plants every day from the ſun till they have taken root; for otherwiſe they will be burnt up and deſtroyed. Let them alſo be ſupplied with water till they have taken root. The waterings ſhould be moderate, and often repeated in dry weather.

If this method be obſerved, they will ſoon take root, and by Michaelmas have gained ſufficient ſtrength to endure the winter's cold. Indeed they generally do better than thoſe which are ſuffered to remain in the ſeed-bed till March.

Water the Seed-Beds of young Plants.

You muſt ſtill continue to water the ſeed-beds of all young ſhrubs once in two or three days at leaſt, during the dry weather.

This will prove of the utmoſt advantage to the young plants, provided the watering be always moderate; for if the water be poured on the beds too haſtily, or given in too great a quantity at one time, it will greatly injure, if not totally deſtroy the plants.

Deſtroy Weeds.

As ſoon as ever you perceive any weeds in the ſeed-beds of your young plants, let them be deſtroyed; for nothing is ſo deſtructive to young ſeedling plants as weeds. Theſe will do the young plants more injury in two or three weeks, than they will be able to recover in a twelvemonth.

But it is not enough that the beds alone be kept free from weeds; every part of the nurſery muſt be the ſame; for this will be at once an advantage to the young plants, and give the whole a pleaſing appearance.

When weeds appear between the rows of tranſplanted trees, they may be expeditiouſly deſtroyed by the application of a good ſharp hoe in dry days.

Above all, be very careful that none of the weeds in any part of the nurſery perfect their ſeeds; for whenever this is permitted, the ſeeds will fall upon the ground, and lay a foundation for a ſeven year's crop at leaſt. Many of them alſo, by their particular form and appurtenances, will be waſted to a great diſtance from the mother plant, and fill the nurſery with diſagreeable inhabitants.

The FRUIT-GARDEN.

Budding.

This is a proper ſeaſon for inoculating or budding fruit-trees.

You muſt remember to bud each ſort upon its proper ſtock. Thus apricots, peaches, and nectarines, flouriſh beſt upon plum-ſtocks; and generally make the ſtrongeſt and moſt laſting trees when budded upon ſtocks raiſed from plum-ſtones.

Pears ſhould be budded upon quince or pear-ſtocks, raiſed from the ſeeds of the reſpective trees. Cherries are generally budded upon cherry ſtocks raiſed from the ſtones.

If any of your cherries, pears, or plums, grafted in the ſpring have miſcarried, they may now be budded with the ſame kind of fruit; for the trees equally ſucceed either by grafting or budding.

You ſhould remember to perform this operation in cloudy weather; at leaſt early in the morning, or in the evening after four o'clock; for the great power of the mid-day ſun is apt to dry the cuttings ſo much, that the buds will not eaſily part from the wood.

When the trees are intended for the wall or eſpalier, the budding muſt be performed above four or five inches above the ground; but if they are deſigned for ſtandards, four, five, or ſix feet will not be too much.

As we have already in the work of the nurſery for June, deſcribed the method of performing this operation, it will be unneceſſary to repeat it here; but it may not be amiſs to add, that budding may alſo be performed upon trees that bear fruit.

If therefore you have either wall or eſpalier trees that produce fruit of a different kind than what you deſire, you may bud them with the ſort more agreeable; but remember to perform the operation on ſhoots of the ſame ſummer's growth.

You may even put ſeveral buds into one and the ſame tree, by which means the wall or eſpalier will be ſoon covered with the deſired kinds, and the trees will, in two or three years after budding, begin to bear fruit.

Wall-Trees.

If any of your wall-trees have not yet received their ſummer pruning and nailing, let it now be done as ſoon as poſſible, otherwiſe the fruit upon thoſe trees will be both ſmall and ill taſted, in compariſon of what they would have been, had not this work been neglected.

Nor is this all, the trees themſelves will likewiſe ſuffer; particularly the apricots, peaches, nectarines, and others, which produce the greater part of their fruit on wood of one year old.

If therefore any trees remain unpruned, let it be done the firſt week in the month, remembering to clear away all the luxuriant wood, and to diſplace all foreright or otherwiſe ill-placed ſhoots. At the ſame time leaving, and nailing cloſe to the wall as many of the well-placed moderate growing ſhoots as can be conveniently laid in; eſpecially of the apricot, peach, and nectarine trees. Remember not to ſhorten any of the ſhoots at this ſeaſon; but let them all be laid in at full length.

With regard to thoſe trees which were dreſſed and nailed during the two preceding months, let them now be again looked over, to ſee if all the ſhoots laid in laſt month keep firm in their places; and whatever ſeems amiſs let it be rectified; at the ſame time obſerving to diſplace all the ſtraggling ſhoots produced ſince the laſt pruning.

Vines.

You muſt now look over your vines once more, in order to clear them from ſuch ſhoots as have been produced ſince laſt month. By purſuing this method, of rubbing off all the ſhoots as ſoon as they appear, your bunches of grapes will be large and well grown; every bunch will ripen regularly, and three weeks ſooner at leaſt, than where the vines were neglected, and permitted to be over-run with uſeleſs ſhoots.

Fig-Trees.

This is a proper ſeaſon for beginning to nail your fig-trees to the wall or eſpalier. Remember not to top or ſhorten any of the ſhoots, but to lay in as many of them as you conveniently can, in a ſtrait and regular manner.

Deſtroy

Deſtroy Snails.

You muſt continue your aſſiduity with regard to deſtroying ſnails; for they will otherwiſe greatly damage your choiceſt wall fruits. Let the trees therefore be often looked over, early in the morning, and at the cloſe of the evening, eſpecially after ſhowers of rain.

Deſtroy Waſps, Hornets, &c.

Waſps, hornets, and other inſects of that kind will now devour many of your choiceſt fruits, if not carefully prevented. Let therefore a ſufficient number of phials filled with ſugar water, be hung upon the branches of the trees, before they begin to attack the fruit.

By this means the greater part of your choiceſt fruits will be preſerved; for the ſmell of the liquor will entice theſe inſects into the phials, where they will be drowned. But it will be neceſſary to look over your phials often, in order to empty the inſects they may contain, and to repleniſh the phials with a freſh quantity of the above ſweetened water.

The PLEASURE or FLOWER-GARDEN.

Management of Choice Carnations.

Your choice carnations will ſtill require a conſiderable degree of attention. Their flower pods, as they begin to break, muſt be aſſiſted by opening the pods deeper according to the manner directed in the preceding month; this is very neceſſary to promote their regular ſpreading, in which one of the principal beauties of choice carnations conſiſts.

Remember to refreſh the pots duly with water; in very hot weather they will require a little once every other day. Remember alſo to protect them, when in bloom, from wet and the mid-day ſun.

The beſt method is to have the top of the ſtage covered with a light covering, ſupported at a convenient height, that it may neither hide the flowers, nor draw them up weak. In order to this, let a light frame of lattice-work, reſembling the roof of a houſe, be made, of the breadth and length of the ſtage; and let this be covered with painted canvas, or oiled paper. This roof ſhould be ſupported by poſts fixed up in proper parts of the ſtage; and of a ſufficient height to admit the flowers being viewed with pleaſure, and at the ſame time to defend the flowers from wet, and the ſcorching rays of the ſun.

Lay Carnations and Double Sweet-Williams.

You may continue to lay carnations and double ſweet-williams, during the whole month; but the ſooner it is done the better. The ſame method laid down in the preceding month muſt be purſued.

Remember to refreſh your layers often with water in dry weather; and where you perceive any of them have ſtarted from their places, let them be again pegged down in their proper poſition.

Tranſplant Carnation Layers.

At the latter end of this month, many of the carnation layers that were laid about the middle of June, will be ſufficiently rooted for tranſplantation.

Let them therefore be looked over, and let ſuch as have ſhot out tolerable roots, be carefully ſeparated from the mother plant. They ſhould be cut off cloſe to the ſlit part of the layer, and planted immediately after cutting off the tops of the leaves.

They may either be planted in ſmall pots, or beds of rich earth. If in the former, the pots muſt be ſet in a ſhady place, and the plants moderately watered from time to time, till they have taken freſh root. In theſe pots they are to remain till March, and then removed into larger pots, where they are intended to blow.

The beds, in which the layers of common carnations are generally planted, ſhould be three feet broad, the earth well dug, and the ſurface raked very even. In theſe beds the layers muſt be ſet as ſoon as taken from the mother plant, in rows five or ſix inches aſunder, and watered as ſoon as planted.

In theſe beds they are to remain till October, when they are to be taken up with balls of earth about their roots, and planted in the borders where they are to flower. But remember, during the interval, to weed and water the beds occaſionally.

Management of tender Annuals.

Let your cockſcombs, tricolars, double-balſams, and other curious annuals, kept till this ſeaſon under glaſſes, be now brought out; remembering to clean the plants from all decayed leaves, to ſtir the earth a little at the top of the pots, and to add a ſprinkling of ſifted earth over it.

Remember alſo to ſupport every plant with a ſtick of a proper height, fixed in each pot, and to let the ſtem of the plant be tied neatly to it in different places.

When this is done, let a moderate quantity of water be gently poured over the head of the plant. This will at once refreſh the plant, cleanſe the leaves from duſt, and give it a very lively appearance.

Remember to place them where they are to remain, and to ſupply the plants duly with water in dry weather.

Tranſplant common Annuals.

If any of your common annuals ſtill remain in the ſeed or nurſery-beds, let them be tranſplanted at the beginning of this month. But remember to take them up with balls of earth about their roots, and to plant them in the places where they are to remain.

As ſoon as they are planted, let them be refreſhed with water, and ſuch as have long ſtems be ſupported with ſtakes.

Remove Perennial Plants.

All your perennial and biennial plants, particularly wall-flowers, ſtock july-flowers, ſweet-williams, columbines, Canterbury and pyramidal bell-flowers, Greek valerian tree, primroſe, ſingle ſcarlet lychnis, roſe campions. French honey-ſuckles, hollyhocks, &c. that ſtill remain in their ſeed beds, muſt now be removed into nurſery beds.

In order to this, let ſome beds of rich earth, three feet and a half broad, be now prepared; and the plants taken up and ſet immediately, each ſort ſeparate, in the nurſery-beds. Each bed will contain ſix rows, and the plants muſt be ſet about ſix inches aſunder in the rows.

Remember to water the plants as ſoon as they are ſet, and to repeat the waterings occaſionally, till they have taken root.

Tranſplant Seedling Auriculas and Polyanthuſes.

It is now time to remove your ſeedling auriculas and polyanthuſes from their ſeed-beds.

In order to this, let a ſpot of ground, well defended from the mid-day ſun, be choſen, neatly dug, and the ſurface raked very even.

This being done, let the plants be taken up, and immediately ſet, about four inches aſunder every way in theſe beds, cloſing the earth well about them, and refreſhing them gently with water.

Remember to keep the beds clear from weeds, and to refreſh them with water every two or three days, in dry weather, during the ſummer ſeaſon.

Propagate Scarlet Lychnis, &c.

You may ſtill propagate ſcarlet lychnis, and other plants of that kind, by cuttings, in the manner laid down in June. But remember to do it at the beginning of the month, leſt they have not time ſufficient to ſhoot out proper roots before the cold weather comes on.

Management of Auricula Plants in Pots.

Examine often your choice auricula plants in pots, taking away all dead leaves as faſt as they appear, and pulling up every weed.

Remember not to omit watering your plants pretty frequently in dry weather.

Take up Bulbous Roots.

Your crown imperials, red lillies, bulbous iriſes, and narciſſuſes, with ſeveral others of the ſame kind, will be now paſt flowering, and their leaves in a decaying ſtate. Let them therefore be taken up in a dry time, and after ſeparating the off-ſets from the principal, the latter may be either planted again immediately, or properly dried, cleaned, and preſerved, till October or November, and then planted regularly in the borders.

The ſmall off-ſets ſhould be planted by themſelves in a nurſery-bed, for a year or two, to gather ſtrength, and then be planted among other bulbous roots in beds or borders.

Trim Flowering Shrubs and Ever-greens.

Let all the rude ſtraggling branches on your flowering ſhrubs and ever-greens, be now cut off with a knife. By this means the head of each plant will be formed in a regular manner, and every ſhrub ſtand ſeparate and diſtinct.

Support Flowering Plants.

Look over your flowering plants, and wherever you perceive a ſupport neceſſary, let a ſtake be fixed in the earth, and the ſtem of the plant tied to it.

If this be done early, few of your plants will be broken by the wind or rain, which would otherwiſe be the fate of many.

Cut down decayed Flower Stems:

Many of your perennial fibrous-rooted plants will now be paſt their bloom; let their ſtems therefore be cut down cloſe to the head of the plant, and all the dead leaves cleared away.

Clip Hedges.

If you would have your hedges perfectly neat, they ſhould be clipped at the beginning of this month, and a ſecond time about the middle of Auguſt; but if you think one clipping ſufficient, it will be better to defer it till the latter end of this month, or the beginning of Auguſt.

Cut Box Edgings.

Your box edgings that were not trimmed laſt month, muſt be trimmed now. But remember to do it in a moiſt time; for when box is cut in dry weather, it will turn brown, and make a very unſightly appearance.

Box edgings ſhould never be ſuffered to grow higher than three or four inches, nor broader than two and a half.

Deſtroy Weeds in the Borders.

Remember to keep your borders, eſpecially thoſe next the walks, intirely free from weeds; and be ſure not to let any of them ripen their ſeed in any part of the garden.

As ſoon as you have hoed the borders, let them be immediately raked, in order to draw off the weeds and all other litter; for this will make the ſurface ſmooth and even, and give the whole a neat and pleaſing appearance.

Mow Graſs-Walks and Lawns.

Your graſs-walks and lawns ſhould be regularly mown about once a week, which will keep the graſs in general in tolerable good order.

Remember, likewiſe, to roll your graſs now and then; for this will be a great addition to the beauty of the plats and walks, and, at the ſame time, render the ſurface firm and even.

Gravel-Walks.

Your gravel-walks will require ſome care. They muſt be rolled twice a week, at leaſt, if they are intended to be kept any thing neat. Nor muſt any weeds be ſuffered to grow, or any ſort of litter be ſeen upon them.

AUGUST.

Work to be done in the KITCHEN-GARDEN.

Cucumber Plants.

YOUR cucumber plants will, at this ſeaſon, demand particular attention, eſpecially thoſe which are ſown in the open ground, to produce fruit for pickling.

Theſe plants muſt be well ſupplied with water in dry weather; they will require it three or four times a week, at leaſt. And it ſhould be remembered, that the quantity of fruit will greatly depend on this circumſtance.

The young fruit ſhould be gathered about three times a week; for when once the fruit have attained a proper ſize, they will ſoon be too large for pickling. Let the

vines be carefully looked over, in a regular manner, every other day.

Ripening Melons.

It will be neceſſary to take particular care of your ripening melons; for if too much rain ſhould happen to fall at this time, it would, in a great meaſure, deſtroy the fruit, unleſs properly defended. Let, therefore, both the roots and fruit be ſheltered by the methods mentioned laſt month.

Sow Winter Spinage.

If the ſeed for a full crop of ſpinage was not ſown laſt month, it muſt be done at the beginning of this.

Let therefore a piece of rich ground, that lies tolerably dry in winter, be neatly dug, the ſeed ſown immediately, trod in, and the ſurface raked even.

As ſoon as the plants have got leaves about an inch broad, let them be thinned and cleared from weeds This may be done either by the hand or hoe, obſerving to thin the plants regularly, leaving them at about four inches from one another. This will give them proper room to ſpread, and gather ſtrength ſufficient to enable them to endure the cold.

It ſhould alſo be remembered, that when ſpinage is allowed room to ſpread itſelf regularly, the plants will produce very large and thick leaves, far ſuperior to thoſe found on plants crowded too near one another.

Sow Cabbage Seed.

Between the ſixth and twelfth of this month, is a proper ſeaſon for ſowing early cabbage ſeed, particularly the ſugar loaf, or early Batterſea kinds.

In order to this, let an open ſpot of rich ground be dug, and divided into beds three feet and a half broad. Sow the ſeed moderately thick, and rake it in lightly with an even hand.

Other kinds of cabbage ſeed, particularly that of the long-ſided cabbage, may alſo be ſown at the beginning of the month.

Sow Cauliflowers.

Between the eighteenth and twentieth of this month, a little cauliflower ſeed ſhould be ſown for raiſing plants to produce an early crop next ſummer; and about a week after ſow for the main crop.

The plants raiſed from the firſt ſowing ſhould be planted out for good about the latter end of October, under hand or bell-glaſſes. Some of the plants may, at the ſame time, be ſet under a ſouth wall, where they will often endure the winter without any other ſhelter.

With regard to the plants raiſed from the ſecond ſowing, and intended for the main crop, they ſhould, for their more certain preſervation, be planted under frames about the laſt week in October, and continue there during the whole winter.

The ſeed muſt be ſown in a ſpot of clean rich ground, neatly dug, and divided into beds three feet and a half broad. As ſoon as the ſeed is ſown, let it be raked in very carefully; or about a quarter of an inch thick of light earth be ſifted over it. In dry weather, the bed muſt be moderately watered from time to time, both before and after the plants appear. By this means the plants will ſoon come up, riſe equally, and all take a regular growth.

Tranſplant Brocoli.

At the beginning of this month, let a ſpot of open ground be prepared for planting out the ſecond crop of brocoli. If a little rotten dung be ſpread over the ground, and well dug in, it will prove of the greateſt advantage to the plants.

Theſe brocoli plants ſhould be planted in rows two feet aſunder, and twenty inches apart in the rows. Remember to give them a little water as ſoon as planted.

With regard to the brocoli planted out laſt month, you muſt now remember to draw the earth about their ſtems; for this will greatly ſtrengthen them, and promote their growth.

Tranſplant Savoys.

This is a very good ſeaſon for tranſplanting ſavoys, for the plants will be in excellent order for the table ſoon after Chriſtmas. Let them be ſet in rows eighteen or twenty inches aſunder, and the ſame diſtance be allowed between the plants in the rows.

Tranſplant Celery.

More celery muſt be tranſplanted at this ſeaſon. Let therefore an open ſpot of ground be choſen, and the trenches prepared in the manner directed laſt month. In theſe trenches, let the plants (after trimming the ends of their roots, and cutting off the tops of their leaves) be ſet four or five inches diſtant, in a ſingle row along the middle of each trench. Remember to water them as ſoon as they are planted, and, if the weather prove dry, to repeat the operation every evening, till the plants have taken root.

Earth up Celery.

As your celery planted in the trenches during the two laſt months advances in height, let it be earthed up. But remember to do this in dry weather, and when the plants are alſo dry. The earth muſt be well broken, and then laid up lightly to the plants.

They muſt be earthed up to a proper height on each ſide; but, at the ſame time, particular care muſt be taken not to break down their leaves, or bury their hearts.

Tranſplant Endive.

Another parcel of endive muſt be now tranſplanted. In order to which, let an open ſpot of ground be properly dug. When this is done, draw up ſome of the ſtrongeſt plants, trim the extremities of their roots, take off the tops of their leaves, and plant them twelve inches from one another every way.

Remember to water them as ſoon as planted, and, if the weather be dry, to repeat the waterings every two or three days, till the plants have taken root.

Blanch Endive.

Towards the latter end of this month, the endive planted out in June will be full grown, and ſhould therefore be tied up to promote their blanching.

When the weather is dry, let the plants be examined, and the leaves of ſuch as are proper for blanching be tied up with freſh baſs. Remember to gather the leaves up regularly in your hand, and to tie them together in a neat manner, but not too ſtraight.

Sow

Sow Turnips.

A late crop of turnips may ſtill be ſown; and if it be done the firſt or ſecond week in the month, there will be very little danger of ſucceſs; but after that time it is not prudent to ſow turnips, for they generally miſcarry.

Hoe and thin Turnips.

The turnips ſown laſt month muſt now be hoed and thinned. But remember to take the advantage of dry days, and do it before the plants are too far advanced in their growth: the time may be known by examining the plants; for when their rough leaves are about the breadth of a man's thumb, the work may be done with expedition and regularity. Six or eight inches ſhould be allowed between the plants.

Sow Onions.

If you omitted to ſow for ſpring onions laſt month, let it be done at the beginning of this; by the ſecond week at fartheſt.

In order to this, let a clean dry ſpot of ground be neatly dug, and divided into beds three feet and a half, or four feet broad. On theſe beds let the ſeed be ſown tolerably thick, but as equal as poſſible, and raked in with a very even hand, that the plants may riſe regularly in all parts of the beds.

It will be prudent to ſow, at the ſame time, a little Welſh onion-ſeed, that if the former ſhould be deſtroyed by the froſt, the latter, which will ſurvive almoſt the ſevereſt winter, may ſupply its place.

The Welſh ſeed ſhould be ſown in the ſame manner as the Engliſh; ſo that the inſtructions given for the latter will be equally ſufficient for the former.

Take up Onions.

Examine your crops of onions; and when you perceive their leaves begin to fall, and wither, the roots have acquired their full growth, and muſt therefore be taken out of the ground. But remember to do this in dry weather, and to ſpread them immediately in the ſhade to dry, as directed laſt month.

Take up Garlick and Shallots.

Your crops of garlick and ſhallots muſt alſo be taken out of the ground when their roots have acquired their full growth, which is known by their leaves, which always begin to wither as ſoon as the roots have done drawing nouriſhment.

Sow Carrots.

About the third or fourth week in this month, but not before, a little carrot ſeed may be ſown, in order to raiſe plants for ſpring uſe. Let the ſeed be ſown in beds, not too thick, and raked in regularly. The plants raiſed from this ſowing will ſupply the table in the ſpring.

Sow Radiſhes.

A little radiſh ſeed, of the ſalmon or ſcarlet kind, may be ſown at two different times this month; about the middle, and towards the latter end. The plants from the former will be fit to draw about the middle of September, and thoſe from the latter about Michaelmas, and continue tolerably good all October.

Remember to ſow the ſeed in an open ſpot of ground, and to water the bed now and then in dry weather.

Sow Lettuce Seed.

A ſmall quantity of the ſeeds of Coſs, Sileſia, brown Dutch, and common lettuce, ſhould be ſown at two different times this month. Let the firſt ſowing be performed before the tenth of the month, and the ſecond between the eighteenth and twenty-fourth. The plants from the firſt will ſupply the table in October and November; but the plants from the ſecond are to be removed into warm borders, in order to ſtand the winter, and ſupply the table in April and May.

Remember to ſow the ſeeds of each ſort ſeparate, to rake them in evenly, and to water the beds now and then in dry weather.

Some of the plants raiſed from the ſeed of the ſecond ſowing, particularly the brown Dutch and cabbage lettuce, may when fit, be planted in ſhallow frames, where they muſt be covered every night, and in all wet, or other bad cold weather, with the glaſſes: in hard froſt they muſt alſo have coverings of dry ſtraw, fern, &c. laid over the glaſſes, and about the outſides of the frames. By this means they will be tolerably well cabbaged by February, when they will be conſidered as a very great rarity.

Tranſplant Lettuces.

Some of the lettuces ſown laſt month, to ſupply the table in autumn, muſt be now tranſplanted.

In order to this, let a ſpot of rich ground, in a dry ſituation, be prepared, and the lettuces planted in it immediately, ten or twelve inches aſunder every way. Remember to water them as ſoon as planted, and to repeat the operation occaſionally, in dry weather, till they have taken root.

Sow ſmall Salleting.

A ſmall quantity of the ſeeds of muſtard, radiſh, creſſes, rape, and turnip, ſhould be ſown once every week, if a regular ſupply of ſome ſalleting herbs be wanting.

A ſhady border muſt be choſen for this purpoſe, where the ſeeds are to be ſown, each ſort ſeparate, in ſhallow drills, and covered with dry earth about a quarter of an inch thick. Remember to water them occaſionally in dry weather.

Thin Colewort Plants.

About the middle, or latter end of the month, look over your colewort plants ſown laſt month; and wherever you perceive they ſtand too thick, let ſome of them be drawn out, and tranſplanted in rows twelve inches aſunder, and the plants ſix inches apart in the rows.

By this means, the plants remaining in the ſeed-bed will have more room to grow, and thoſe taken up and tranſplanted will be fit for uſe three or four weeks ſooner than if they had been left in the ſeed-bed till next month.

Clean Aſparagus Beds.

Remember to clear your beds of aſparagus from weeds and litter of every kind, particularly thoſe that were planted laſt March or April.

At the ſame time, let the ſeedling aſparagus ſown in the ſpring be kept very clean: a careful hand-weeding will beſt anſwer this purpoſe.

Examine Artichoke Plants.

Your artichoke plants ſet in March or April muſt be now examined, as many of them will be in fruit; and beſides the principal, or top artichoke, there will riſe many ſmall heads, or ſuckers, from the ſides of the ſtems; but all theſe ſhould be diſplaced, if you deſire the principal head to be large. It will, however, be neceſſary to take theſe off before they exceed the ſize of an egg, otherwiſe they will have exhauſted too much of the ſtrength of the root; and, conſequently, render the principal head proportionably ſmaller.

It may not be amiſs to repeat the caution mentioned laſt month, of breaking down the ſtems of the artichokes when you cut the fruit.

Propagate Sweet Herbs.

The ſlips of many of the aromatic herbs, particularly thoſe of ſage, hyſſop, maſtich, marjoram, lavender, rue, and roſemary, may ſtill be planted, for they will ſucceed, if planted in the beginning of the month.

The ſlips muſt be from ſix to nine inches long, and planted in a ſhady border. Remember to put two-thirds of the ſlip into the ground, and to water them occaſionally in dry weather.

Trim Aromatic Herbs.

The decayed flower-ſtems of hyſſop, ſavory, lavender, and other aromatic plants of that kind, ſhould be cut down, and all the ſtraggling and other young ſhoots ſhould be ſhortened at the beginning of this month.

But remember to do this in a moiſt time, if poſſible. The flower ſtems, and young ſhoots, ſhould be cut pretty cloſe, with a pair of garden ſhears. This will make them put out numbers of freſh ſhort ſhoots, ſo that they will form cloſe ſnug heads before winter, and appear neat during that dreary ſeaſon.

Gather Herbs to dry and diſtil.

Let the herbs intended to ſerve the family in the winter be cut down in a dry day, and ſpread to dry in an airy room, out of the reach of the ſun. When thoroughly dried, let them be tied in bunches, and hung up in a dry room for uſe.

This is alſo the ſeaſon for cutting down many plants for diſtillation. But remember to do it when they are in flower, for then they are in their full prime.

Gather Seeds.

As young ſeeds ripen, let the heads or pods be gathered in a dry day; and as ſoon as they are cut let them be ſpread on mats or cloths, to dry and harden, in a ſhady place, where no rain can touch them. In about a fortnight the heads or pods will be ſufficiently dry, and the ſeed ſhould therefore then be beaten or rubbed out, and well cleaned.

When you have thus procured clean ſeed, let it be ſpread upon cloths in a dry but ſhady place, for a day or two, to harden, and then put up in bags or boxes for uſe.

Deſtroy Weeds.

You muſt be very careful, at this ſeaſon to deſtroy the weeds, among all your crops. Be ſure never to let them get to any great head; nor any of them ever ripen their ſeed. This care muſt be extended to every part of the garden, whether cropped or not.

By this means you will keep the weeds under; for it ſhould be remembered that every weed ſuffered to ripen its ſeed, will lay a foundation for hundreds the year to come. No care therefore ſhould be wanting to deſtroy them before they arrive at maturity.

In open ſpots, and wherever there is room to uſe a hoe, this is eaſily done; but remember to let your hoe be ſharp, and let it be done in a dry day.

When you have hoed down the weeds, do not ſuffer them to lie on the ground where they grow, but rake them up, and carry them away.

The NURSERY.

Tranſplant Seedlings.

Examine the buds of your ſeedling plants, particularly thoſe of the pine, fir, and box; and wherever you perceive the plants crowded too cloſe together, let ſome of them be drawn up and tranſplanted, obſerving the ſame directions that were given laſt month. For though this is not the ſeaſon for making a general tranſplantation; yet where the plants ſtand too cloſe together, ſome of them ſhould be removed, otherwiſe they will ſpoil one another.

Prepare Ground for Tranſplanting.

About the latter end of this month, it will be time to begin trenching ſuch pieces of ground as are intended to be planted in autumn, with any kind of trees or ſhrubs. The ground ſhould be well dug and laid up in high ridges, that it may enjoy every poſſible advantage from the rains, ſun, and dews.

Remember to keep the whole ſpot free from weeds; cutting them up with the hoe as ſoon as they appear, and carrying them off the ground.

Trim Ever-greens and Foreſt Trees.

This is a proper ſeaſon for trimming ever-greens and ſuch other ſhrubs in the nurſery, that appear to want it. Remember to cut away the vigorous ſhoots, or to ſhorten them ſo as to form a more regular head.

At the ſame time examine your foreſt-trees, and wherever you perceive they have made any vigorous ſhoots from their ſtems near the roots, let ſuch ſhoots be cut off cloſe.

Bud Fruit Trees.

The operation of budding may ſtill be performed on ſome ſorts of fruit-trees, provided it be done at the beginning of the month.

You muſt alſo now look over the ſtocks that were budded three weeks or a month before, in order to untye the baſs, that the parts about the bud may not be pinched.

Weed and water Seedling Plants.

Remember to keep your beds of ſeedling plants entirely free from weeds; and to water them occaſionally in dry weather.

Deſtroy

Deſtroy Weeds.

Let the ſpaces between the rows of all kinds of young trees and ſhrubs be deſtroyed. Remember to do this work in dry days; and when the weeds are ſo cut down with the hoe, to rake them up, and carry them away; for otherwiſe many of the larger weeds would take freſh root, and grow up again.

The FRUIT-GARDEN.

Wall Trees.

Your peach, nectarine, and other trees of that kind ſtill require attention. It will be neceſſary to look them once more carefully over, and wherever you find any of the branches diſplaced by the wind or other accident, to nail them again in a neat and ſecure manner.

At the ſame time take away all the ſtraggling ſhoots that have been lately produced, for they will only tend to hinder the ripening of the fruit.

Vines.

You muſt once more look over your vines, whether planted in vineyards, or againſt walls, in order to diſplace every ſhoot that has been lately produced, whether from the old or young wood; for they are all not only entirely uſeleſs, but will tend greatly to retard the growth and ripening of the fruit.

At the ſame time examine carefully all the bearing or other proper ſhoots; and wherever you perceive any of them ſtarted from their places, faſten them again to the wall or ſtakes, in their proper direction. By this means, every bunch of fruit will ripen equally, for every one will enjoy equally the advantages of the ſun and air.

It will alſo be proper to examine the fruit, and wherever you find the branches entangled either with one another or with the ſhoots, let them be relieved, ſo that every bunch may hang in its proper poſition.

Fig Trees.

The figs will be now full grown and begin to ripen; conſequently a proper ſhare of the ſun will be neceſſary to give them a flavour.

In order to this, let all the young ſhoots be now laid in cloſe to the wall, taking care to uſe the knife at this ſeaſon as little as poſſible. Let therefore no ſhoots, except thoſe which are produced foreright, be now cut off; laying in all the fair growing ſide-ſhoots to produce fruit next year. And as theſe trees produce their fruit upon none but ſhoots of one year old, it is the ſafeſt way to leave enough of them at this ſeaſon; for all that are not wanted to lay in at the general ſeaſon of pruning, may then be cut away.

But whatever you do with regard to theſe ſhoots, be ſure not to ſhorten them; they muſt be laid in at their full length; for the ſhoots of theſe trees muſt never be ſhortened.

Remember to lay them in regularly, not acroſs one another, and to ſecure them properly, for the broad leaves of theſe trees give the wind and rain great power over them.

Bud Trees.

You may ſtill perform the operation of budding with ſucceſs, provided it be done at the beginning of the month. The ſame method may be purſued as is given in the work of the nurſery for June.

Examine Budded Trees.

It will be neceſſary to look over your trees that have been budded about three weeks or a month, in order to looſen the bandage; for if this be neglected, the motion of the ſap will be greatly impeded, the parts about the bud will ſwell irregularly, and four out of five of the buds will miſcarry.

At the ſame time remember to examine the part of the ſtock below the bud, and rub off all the ſhoots produced in that part.

Defend Wall Fruit from Birds, Inſects, &c.

Your choice wall-fruit will ſtill want your care to defend it from birds, inſects, &c.

The former may be effectually kept off by fixing up nets before the trees whoſe fruit they are fond of. This precaution therefore ſhould not be omitted; particularly with regard to grapes, figs, and late cherries.

With regard to waſps, flies, and hornets, the beſt method is that mentioned laſt month, namely, by fixing phials filled with ſugar-water, on proper parts of the tree; for the ſweetneſs of the water will allure the inſects from the fruit, and induce them to crawl into the bottles, where they will be drowned.

Cleanſe the Borders about Fruit Trees.

No weeds ſhould be ſuffered to grow, or litter of any kind to lie, on fruit-tree borders.

The keeping theſe borders clean will be attended with a double advantage; the trees will not be deprived of their nouriſhment; and at the ſame time, the clean ſmooth ſurface of the ground will reflect the ſun's heat upon the tree, and conſequently promote the ripening, and improve the flavour of the fruit. Add to this, the agreeable pleaſure the eye will receive from the neatneſs of the borders.

Deſtroy Weeds.

Remember to deſtroy all the weeds between the rows of vines in the vineyard; let them be cut down as ſoon as they appear; and when this is done, let them, together with all other kind of litter, be taken away.

This will greatly promote the growth and ripening of the grapes; for a perfectly clean ſurface in a vineyard, anſwers in ſome degree the purpoſe of a wall, by reflecting the ſun's heat upon the vines and fruit.

But were the weeds permitted to grow, no heat could be reflected from the ſurface. On the contrary, a moiſt vapour would ariſe from the intervals between the rows, which would greatly retard the growth and ripening of the grapes; beſides robbing the roots of great part of their nouriſhment.

The PLEASURE or FLOWER-GARDEN.

Management of Carnations and Sweet William Layers.

All thoſe carnation layers that were layed five or ſix weeks ago, will now be well rooted, and ſhould therefore be cut from the original root, and tranſplanted into beds or pots. The choiceſt kinds ſhould be planted in pots, that they may be more eaſily defended from the cold of the winter.

In order to this, let a quantity of penny or half penny pots be procured, and filled with good earth.

This

This being done, take off the layers, trim their tops a little, cut off the bottom of the ſtalk cloſe to the ſlit part, plant one layer in each pot, and immediately give it a little water.

When all are planted place the pots in a ſhady ſituation, and water them occaſionally till they have all fairly taken root.

As ſoon as you perceive the plants are firmly rooted, let the pots be removed into a more open ſituation, and there remain till the latter end of October. At that time a bed of dry compoſt ſhould be prepared, of the breadth and length of a common frame: the bed muſt be compoſed of dry and light earth well mixed with coal aſhes, and raiſed at leaſt four inches above the level of the ground. When the bed is thus prepared put on the frame, and plunge the pots up to their rims in the compoſt, and as near together as may be; for here the plants are to remain all the winter, and to be defended in ſevere froſts, ſnow, and heavy rains with glaſſes; but in dry and mild weather the glaſſes muſt be taken away.

By this means the plants will be effectually preſerved from froſt, which cannot enter at the ſides of the pots to hurt the roots.

If a frame and glaſſes be wanting, the pots may be plunged in a bed prepared as above, and effectually defended by fixing hoops acroſs the bed, and covering them with thick mats in bad weather.

In this bed the plants are to remain till the latter end of February, or the beginning of March, when they are to be turned out of the ſmall pots with balls of earth about their roots, and planted in larger, where they are to blow.

With regard to the common carnation layers intended to blow in the borders, they ſhould be managed as follows:

As ſoon as the layers are well rooted, they are to be ſeparated from the old roots, and trimmed as above directed; and then planted in a bed or border of rich earth. They ſhould be ſet at leaſt ſix inches aſunder every way, watered immediately, and the operation repeated occaſionally till they have taken root. Remember alſo to ſhade them from the ſun till they are well rooted.

In this bed or border the layers are to remain till October; and then tranſplanted into the borders where they are to flower.

The layers of double ſweet-williams that were layed five or ſix weeks ago, muſt be now taken from the old roots, and managed in the ſame manner as the layers of carnations.

Propagate Fibrous-rooted Plants.

This is a proper ſeaſon to increaſe many of the double flowering fibrous rooted plants, particularly the double roſe campion and catchfly, double ſcarlet lychnis, and double rocket, double ragged robin, batchelors button, &c. by parting their roots, which is done in the following manner:

Where the plants have grown into large tufts, let the whole of each root be taken entirely out of the earth. When this is done let it be divided, taking care that every plant or ſlip ſo ſeparated, be properly furniſhed with roots.

The root being thus parted into ſeveral ſlips or diſtinct plants, let the ends of the roots of every ſuch ſlip or plant be cut off, and all the dead and broken leaves taken away.

As ſoon as your plants are thus prepared, let them be planted in a ſhady border, or where they can be occaſionally ſhaded with mats, about ſix inches apart. Remember to cloſe the earth well about them, and to give them a little water. Some of the ſtrongeſt ſlips may be immediately planted again in the borders.

They will ſoon take root, if occaſionally watered, and by the latter end of October have acquired ſtrength ſufficient to be removed, when they are to be taken up with balls of earth about their roots, and planted ſome in pott, and the reſt in borders: they will all flower next ſummer.

Sow the Seeds of Auriculas and Polyanthuſes.

Auricula and polyanthus ſeed may now be ſown, in boxes or large pots. Let therefore ſome pots or boxes be filled with light earth, about the middle or latter end of the month. On the ſurface of this mould let the ſeed be ſown pretty thick, and covered about a quarter of an inch deep.

Remember to place your pots or boxes where the ſeed may have the benefit of the morning ſun, and let them continue there till the latter end of next month, when they are to be removed into a ſituation where the mid-day ſun may ſhine upon them.

Sow the Seeds of Bulbous-rooted Flowers.

About the latter end of the month you may ſow the ſeeds of tulips, hyacinths, narciſſuſes, iriſes, crown imperials, frutillarias, lilies, martagons, crocuſes, and other bulbous-rooted flowers.

It will be much the better method to ſow theſe ſeeds in boxes, rather than in beds, becauſe the former may eaſily be removed to any ſituation. Theſe boxes ſhould be about fifteen or eighteen inches broad, and ten or twelve deep, and filled within half an inch of the top with fine rich earth raked very fine and even.

On the ſurface of this earth let the ſeed be ſown moderately thick, and covered about half an inch deep with ſifted earth.

When the ſeed is thus ſown, let the boxes be removed into a ſhady ſituation, and, if the weather proves dry, lightly watered now and then. In this place they are to continue till the latter end of September, when they muſt be removed into a warmer ſituation.

But if you have not boxes for this purpoſe, the ſeed may be ſown in beds of light earth, about three feet broad, and ſituated in a dry and warm part of the garden.

You muſt however remember to defend the plants, whether ſown in beds or boxes, from ſevere froſts and ſnows, by laying dry litter on the ſurface of the beds, and outſide of the boxes.

About the latter end of next March the plants will begin to appear, and muſt be kept clear from weeds, and refreſhed often with water in dry weather.

Sow the Seeds of Anemones, Ranunculuſes, &c.

The ſeeds of anemones, ranunculuſes, and ſpring cyclamens may now be ſown; but it ſhould be done in boxes or wide-mouth pots, filled with rich light earth.

The ſeeds ſhould be ſown pretty thick on the ſurface, and covered about a quarter of an inch thick with ſifted earth.

Remove Bulbous Roots.

The roots of crown imperials, martagons, red lilies, bulbous and Perſian irifes, narciſſuſes, ſpring crocuſes, jonquils, and fritillarias, may now be taken up, and the off-ſets ſeparated from them.

When this is done the principal roots may either be planted again in their proper places, or dried, cleaned, and put up till October, and then planted.

With regard to their off-ſets, the beſt of them at leaſt ſhould be planted in nurſery-beds, each ſort ſeparate, and remain there a year or two.

Tranſplant Perennials.

The ſeedling wall ſtocks, ſweet-williams, columbines, ſcabiouſes, and other perennial and biennial plants, which ſtill remain in the ſeed-bed, muſt be now tranſplanted into nurſery beds.

But remember to let it be done in moiſt weather, and the ſooner in the month the better; becauſe the plants will have more time to root and get ſtrength before winter.

Let them be planted in beds about ſix inches diſtance from one another every way, and directly watered.

After ſtanding about two months, they muſt be tranſplanted from theſe beds into the places where they are to remain.

Trim flowering Plants.

Remember to look over all your flowering plants, and wherever you perceive any brances advance in an irregular and ſtraggling manner, let them be either cut off cloſe, or ſhortened. And where the ſhoots of different branches interfere with one another, let them be ſhortened, that every branch may ſtand ſingle; for flowers always appear to greater advantage when they ſtand clear of each other, than when they are blended together.

Let the main ſtems be well ſupported with ſtakes, and all the whithered and decayed leaves pulled off.

All the ſhoots produced near the ground by ſtrong branching annual flowers, ſuch as French and African marigolds, &c. ſhould be cut away, and a foot at leaſt of clear ſtalk left above the ſurface. By this means the plants will form handſome and regular heads, the flowers will have more liberty to grow, and ſhew themſelves to much greater advantage.

Gather Flower Seeds.

The ſeeds of ſuch flowers as are now ripe ſhould be gathered in a dry day; and ſpread to dry in an airy ſhady place.

As ſoon as they are ſufficiently hardened let them be beat or rubbed out, and preſerved for uſe in bags or boxes.

Cleanſe the Borders from Weeds, &c.

Remember to keep the borders exceeding neat, and free from weeds. In order to which they ſhould be frequently gone over with a ſharp hoe, to looſen the ground, and cut up the weeds as they appear.

When this is done, let them be neatly raked, in order to draw off all the weeds and other litter, and to lay the ſurface ſmooth and even.

Clip Hedges.

This is the moſt proper ſeaſon for clipping your hedges of holly, yew, hornbeam, elm, lime, thorn, &c. provided you trim them but once in the year, for they will not now puſh out any more branches of conſequence this ſummer.

And thoſe which were clipped about the beginning or middle of laſt month, will want clipping again about the middle or latter end of this.

Cut Box and Thrift Edgings.

This is alſo a proper ſeaſon for cutting box and thrift edgings; but remember to do it in moiſt weather, and not to let thoſe of box grow too broad.

The decayed flower ſtalks of your thrift edging ſhould now be cut off, and where the ſides have grown uneven they ſhould be reduced to order with a pair of garden ſheers, ground very ſharp at the points.

Water Annual and Perennial Plants.

Remember to water your annual and perennial plants frequently in dry weather: thoſe of the former preſerved in pots, will require it three or four times a week.

At the ſame time let all the dead leaves on your annual plants be taken off; and the ſtalks of thoſe perennial plants that have done blowing be cut down, a little of the old earth taken from the ſurface and replaced with freſh, and the pots ſet in a ſhady place.

Mow Graſs Walks and Lawns.

It will be neceſſary to continue the mowing of graſs walks and lawns, once a week at leaſt.

It will be alſo neceſſary to poll and roll them frequently; for otherwiſe the worm-caſts and other protuberances on the ſurface will greatly impair their beauty.

Gravel Walks.

Remember to keep your gravel walks entirely free from weeds and other litter, and to roll them twice a week at leaſt.

SEPTEMBER.

Work to be done in the KITCHEN-GARDEN.

Cauliflowers.

ABOUT the middle or latter end of the month it will be time to remove the cauliflower plants ſown in Auguſt, into a nurſery-bed.

In order to which let a bed be made in the manner deſcribed laſt month, in a well ſheltered part of the garden open to the ſun, for their reception.

As ſoon as the bed is finiſhed, draw up ſome of the beſt plants from the ſeed-bed, clear them from decayed or damaged leaves, and plant them in rows about three inches aſunder, allowing the ſame diſtance between the plants

plants in the rows. Remember not to plant them ſo deep as to bury their hearts, for that would inevitably deſtroy them.

Give the plants a little water to ſettle the earth about their roots, as ſoon as they are ſet; but be ſure not to pour the water upon them too haſtily, leſt you break their leaves, or waſh the earth into their hearts.

The plants being thus ſet, put on the frame and glaſſes for a few days till the plants have taken root, remembering to ſhade the plants from the rays of the ſun; when the glaſſes are to be removed, and only applied in very heavy rains, during an interval of a month at leaſt.

Michaelmas Cauliflowers.

About the end of this month, ſome of the cauliflowers planted out in July for a Michaelmas crop, will begin to ſhow their flowers. The plants muſt therefore be encouraged as much as poſſible, by hoeing between, and drawing the earth up round the ſtem of each plant, and keeping them entirely free from weeds.

At the ſame time remember if the weather proves dry, to form the earth like a baſon round each plant, and pour water therein; for this will ſo greatly encourage their growth, that they will produce large heads in October and November. Whereas their heads would have been ſmall at the proper ſeaſon, had the plants been denied a ſufficient degree of moiſture.

Brocoli.

During the firſt or ſecond week in this month, your laſt crop of brocoli muſt be tranſplanted into the place where they are to produce their heads.

In order to this, let a rich ſpot of ground be dug for theſe plants in a warm ſituation, and the brocoli planted in rows a foot and a half aſunder, allowing the ſame diſtance between the plants in the rows.

With regard to the brocoli planted out in the preceding month, they want no other care than that of hoeing the ground, and deſtroying the weeds between the rows, and of drawing up the earth round the ſtems of the plants.

Cabbage Plants.

About the middle of this month, the cabbage-plants ſown the ſecond week in Auguſt, for an early crop next ſummer, muſt be pricked out into the nurſery-beds.

Let, therefore, a piece of good ground, in a ſheltered ſituation, be dug for that purpoſe, and laid out in beds three feet and a half wide.

When the beds are ready, thin out the beſt plants regularly in the ſeed-bed, leaving the ſmaller for a fortnight longer; and plant them in rows length-ways of the bed, about four inches aſunder, leaving an interval of ſix inches between the rows. Remember to cloſe the ground well about their ſtems, and to leave the ſurface ſmooth between the plants.

As ſoon as the plants are ſet, give them a little water, and if the weather be dry, repeat the watering two or three times during the firſt week or ten days, when the plants will have taken good root.

Coleworts.

Some time in the beginning of this month many of the forwardeſt of the colewort plants ſown the latter end of July, will be fit to plant out into the places where they are to remain.

Let therefore a piece of ground be dug for their reception, in a part of the garden where the cutting winds in the winter have the leaſt power; and there planted in rows ten or twelve inches ſunder, and the plants ſix or eight inches apart in the rows.

Turnips.

The turnips ſown the preceding month muſt now be hoed out regularly, leaving them about eight inches diſtant from one another.

Your hoe ſhould be ſharp, and of a middle ſize, that the weeds may be cut up clean.

Spinage.

The ſpinage ſown in Auguſt muſt now be cleared and thinned out regularly, to the diſtance of four or five inches, either by the hand or hoe. But remember to leave the ſtrongeſt plants, and to clear the whole bed perfectly from weeds.

If you omitted to ſow ſpinage laſt month, it may ſtill be done, provided it be not deferred longer than the middle of the month. It will ſucceed tolerably well, if the ſeed be ſown in a rich warm ſoil.

Onions.

Your beds of onions ſown the beginning or middle of Auguſt will now want weeding; for the weeds muſt never be ſuffered to get the ſtart of the plants. This work muſt be done very carefully, and entirely by hand; otherwiſe many of the young plants will be drawn up with the weeds. But the onions need only be thinned, at preſent, except in thoſe places where they riſe in cluſters.

Lettuces.

Towards the latter end of this month, the different ſorts of lettuces ſown in Auguſt, for ſpring uſe, ſhould be planted out where they are to continue.

Let therefore a warm border, under a ſouth wall, or other fence, be prepared for their reception; obſerving, when you dig the ground, to lay the border ſomewhat ſloping to the ſun, and afterwards to rake the ſurface ſmooth and even.

When the border is thus prepared, let ſome of the beſt plants be drawn out of the ſeed-bed, and after trimming the ends of their roots a little, and picking off all the broken or decayed leaves, let them be planted in rows length-ways of the border, about four or five inches aſunder, allowing the ſame diſtance between the plants in the rows.

If the greater part of theſe plants ſurvive the winter, near one half of them may be removed in the ſpring, and planted in a more open expoſure; while the reſt may remain in the border to cabbage early.

It is not yet too late to ſow a little lettuce-ſeed for ſpring uſe, provided it be done in a rich ſpot of ground during the firſt week in the month.

Small Salleting.

The ſeeds of creſſes, muſtard, radiſh, and rape, ſhould be ſown every week or ten days, in rich, light earth, and in a warm ſituation.

The ſeeds ſhould be ſown in ſhallow drills, and covered about a quarter of an inch deep with light earth.

The ſeed ſown the laſt week in the month, muſt be covered with a frame and glaſſes during the nights, if the weather be cold.

Celery.

A late crop of celery, for ſpring uſe, ſhould be planted out about the middle of this month.

In order to this, let ſome trenches about twelve inches wide, and five or ſix deep, be dug, leaving an interval of two feet and a half between the trenches.

Take up the celery plants, trim their roots and tops, and plant one row in each trench, about four or five inches aſunder.

Earth up Celery.

The rows of celery planted in trenches during the former months, muſt be earthed up. Remember to do it when the plants are dry, to break the earth well, and to lay it properly to the plants, without breaking the ſtalks, or burying the hearts.

Plant Endive.

At the beginning of this month ſome endive muſt be planted out on a dry ſpot, in a warm ſituation, for winter uſe. Let the plants be a foot diſtant from one another every way.

Blanch Endive.

Let the leaves of endive be tied together, when both the weather and plants are dry, in order to blanch it; obſerving to tie up ſuch plants only as have arrived at, or near, their full growth. The leaves muſt be gathered up evenly in the hand, and tied together with a ſtring of baſs.

Cardoons.

By the beginning of this month your cardoons will be advanced to a ſufficient height for blanching. Let therefore their leaves be gathered up, and tied cloſely and regularly together with hay-bands; beginning at the bottom, and winding the bands of hay pretty cloſe together about the plants, as high as you intend to earth them.

When this is done, let the earth be well broke, and laid up about the plants as high as they are tied.

Muſhrooms.

This is the ſeaſon for beginning to prepare the dung, in order to make muſhroom beds.

But it will be neceſſary, before the beds are made, to be provided with a proper quantity of the ſpawn, in order to plant in the bed.

The ſpawn of muſhrooms, from which only they are propagated, looks like a white mouldineſs ſhooting out in long ſtrings. It is frequently found among the dung of old hot-beds, or in dung-hills, eſpecially where much litter has been mixed with the dung, and the wet has not penetrated ſo as to rot it. It may alſo be procured by mixing ſome long ſtable-dung, which has not been thrown up in a heap to ferment, with ſtrong earth, and then laying this mixture under cover, where it cannot be wet, and where the air may be excluded from it as much as poſſible; for the more effectually it is kept from air, the ſooner will the ſpawn be produced.

It will generally appear in about two months, if the heap has not laid ſo cloſe together as to heat (for that will deſtroy the ſpawn;) and eſpecially if it has been well covered with old thatch or litter, which has lain ſo long abroad, as to have loſt the power of fermenting.

Theſe are expedients by which the ſpawn of muſhrooms may be procured almoſt at any time, by thoſe who have not muſhroom-beds in their gardens, and conſequently cannot collect it from their remains: for there are only two months in the year when it can be gathered from downs or paſtures; namely, in Auguſt and September, when muſhrooms ſpring up naturally in many of theſe places.

To procure this ſpawn, the ground ſhould be opened about the roots of muſhrooms, and ſuch earth as is there found full of ſmall white knots, which are the offſets, or young muſhrooms, ſhould be careſully gathered up, ſo as not to break either the lumps, or the earth about them. This ſpawn ſhould be kept dry till you have occaſion to uſe it; for the drier it is, the better it will take to the bed, as has been remarkably experienced by Mr. Miller, who declares that he never ſaw thoſe plants produced ſo ſoon, or in ſo great plenty, as from a parcel of their ſpawn, which had lain near the oven of a ſtove for upwards of four months, and was become ſo dry, that he deſpaired of its ſucceſs.

When a proper quantity of the ſpawn is procured, let the beds be made of dung, plentifully intermixed with litter, but not thrown in a heap to ferment. The beſt dung for this purpoſe, is that which has lain ſpread abroad for a month or longer.

The breadth of theſe beds ſhould be about two feet and a half at the bottom, and their length proportioned to the quantity of muſhrooms intended to be raiſed.

Theſe beds muſt be made on the ſurface of a dry ſpot of ground, by ſpreading upon it firſt a layer of dung, about a foot thick, and upon this about four inches deep of ſtrong earth; then a couch of dung about ten inches thick, and upon that another layer of earth, contracting the ſurface of the bed all the way till it terminates like the ridge of a houſe. This may be done with three layers of dung, and as many of earth.

When the bed is finiſhed, it ſhould be covered with litter, or old thatch, as well to prevent its drying, as to keep out the wet; and after it has remained eight or ten days in this ſituation, it will be of a proper temperature for receiving the ſpawn.

The bed being thus in readineſs, the thatch or litter ſhould be taken off, the ſides of the bed ſmoothed, and a covering of rich dry earth laid all over it about an inch thick.

Upon this the ſpawn ſhould be placed, by laying it in lumps about two or three inches aſunder, in ſuch a manner as to prevent their ſlipping down; and then the whole covered gently with the ſame light earth as was uſed before, about half an inch deep.

The covering of litter ſhould then be replaced over the bed, ſo thick, as to ſecure it from wet, and prevent the drying.

If the weather be temperate, and the ſpawn placed in the beds about the middle of the month, the muſhrooms will come up about the middle of October. Sometimes, indeed, the beds will not yield any muſhrooms for near ſix months after their being planted: but the gardener ſhould not be diſcouraged at this diſappointment; for they will then produce uncommon quantities, and continue in perfection for a long time.

The great art in managing theſe beds, conſiſts in keep-

keeping them conſtantly in a due degree of moiſture, and, above all, not to ſuffer them to receive too much wet; for that would inevitably deſtroy the ſpawn of the muſhrooms.

The muſhrooms produced from theſe beds have a much finer flavour than any gathered in the fields; and if the above directions are obſerved, they may be had in plenty during the whole year: for each ſingle bed will continue good for ſeven months at leaſt; and yield great quantities, if the ſpawn takes kindly.

You ſhould remember, when any of theſe beds are deſtroyed, to take away the ſpawn, and lay it up in a dry place till the proper ſeaſon for uſing it arrives, which ſhould not be ſooner than five or ſix weeks, that it may have time to dry well before it is put into a new bed; for, otherwiſe, there will be ſome danger of its ſucceeding.

The NURSERY.

Dig and Trench the Ground for new Plantations.

This is the ſeaſon for digging and trenching the ground where you intend to plant out a nurſery of young ſtocks for fruit-trees; and alſo where you intend to plant out young foreſts trees, or any kind of hardy ſhrubs.

Tranſplanting.

You may begin to tranſplant about the laſt week in the month many of the more hardy kinds of trees and ſhrubs, whoſe leaves are then decayed, eſpecially if the weather be ſomething moiſt.

But if the weather ſhould be very dry, you muſt be ſure to give them a plentiful watering as ſoon as they are tranſplanted.

Several advantages attend the tranſplanting of trees ſoon after the leaves decay; they will have time to take root before the froſt is ſevere enough to prevent it; and by the next ſummer they will be ſo well eſtabliſhed, that the drought of that ſeaſon cannot hurt them.

It ſhould, however, be remembered, that ſuch trees only ſhould be now tranſplanted, whoſe leaves are abſolutely decayed; for with regard to the reſt, they muſt continue ſome time longer before they are removed.

Tranſplant Fruit-Trees.

All thoſe fruit-trees whoſe leaves are now decayed, may alſo be tranſplanted at the latter end of this month. But be ſure to give them ſome water, if the weather be dry.

Tranſplant Stocks to Bud or Graft upon.

During the laſt week in this month, the ſtocks raiſed for budding or grafting different kinds of fruit upon, may be tranſplanted into the places where they are to remain.

Tranſplant Evergreens.

Laurels, Portugal laurels, lauruſtinus, arbutus, phillyreas, and ſeveral other kinds of evergreens, may be tranſplanted about the middle, or towards the latter end, of the month; for they will then take root freely; but remember to give them ſome water ſoon after they are planted.

Propagate Trees and Shrubs by Cuttings.

Gooſeberry and currant-trees may be propagated by cuttings, about the middle or latter end of the month. They will indeed ſucceed, if the cuttings are planted any time between the middle of this month, and the latter end of February; but thoſe planted in this, or the ſucceeding month, generally make the fineſt trees.

Remember that the cuttings, either of the gooſeberry or currant-tree, muſt be taken from the ſame year's ſhoots, and be from ten to fifteen inches in length: they ſhould be planted in a ſhady border.

Honeyſuckles may alſo be propagated from cuttings, about the latter end of the month.

The cuttings ſhould be from ſtrong ſhoots ten or twelve inches in length, and planted in rows about a foot aſunder, and ſix or eight inches apart in the rows. Each cutting muſt be ſet about half way into the earth.

The laurel and Portugal laurel may be propagated by cuttings any time this month; but the cuttings muſt be planted in a ſhady border.

Let the cuttings be taken from the moderate growing ſhoots of the ſame year's growth, remembering to cut off with each ſhoot two or three inches of the laſt year's wood; for this will render the ſucceſs more certain.

When you have provided yourſelf with a ſufficient number of cuttings, take off all the leaves from the bottom half way up the ſhoot; plant them in a ſhady border, putting each cutting as far into the earth as it is ſtripped of its leaves, and give them a little water as ſoon as planted.

Deſtroy Weeds.

Remember to hoe the intervals between the rows of all kinds of trees and ſhrubs, during dry weather, in order to deſtroy all the weeds before the autumn rains begin.

Indeed every part of the nurſery ſhould be kept as free from weeds as poſſible, for they will grow very faſt at this ſeaſon.

The FRUIT-GARDEN.

Plant Strawberries.

Any time this month is a proper ſeaſon to plant ſtrawberries, provided the weather be moiſt; but if the weather be very hot and dry, it will be proper to defer the work till the middle or latter end of the month.

The beds intended for theſe plants ſhould be four feet broad, and four rows ſhould be planted in each bed; allowing an interval or alley of eighteen or twenty inches broad, between the beds, for the convenience of going in to weed, water, and gather the fruit.

Vines.

Look over your vines once more, to ſee that the fruit equally enjoy the benefit of the ſun and air. And wherever you perceive any of the bunches to be too much ſhaded, let ſome of the leaves be taken off; looſening and diſentangling any of the bunches that may be confined, either by the branches or other bunches.

At the ſame time, if you perceive the vines have made any ſhoots ſince they were laſt looked over, let them be rubbed off cloſe; for they are not only uſeleſs, but will alſo draw away part of the nouriſhment from the fruit.

Peaches, Nectarines, &c.

Let your peach, nectarine, ann other wall trees be again examined; and wherever you perceive any of the branches to be looſe, or project from the wall, let them be faſtened up in their proper places. By this means the branches will be in no danger of being broken by the wind, and, at the ſame time, the fruit will enjoy the benefit of the ſun to ripen it.

If you perceive any of the fruit to be too much covered with leaves, let ſome of them be diſplaced. But remember that this is only to be practiſed where they are uncommonly thick, for a ſufficient quantity of leaves is abſolutely neceſſary to the growth and ripening of the fruit.

Deſtroy Waſps, &c.

You muſt ſtill continue your phials of ſugared water, in order to catch the waſps, flies, &c. which will otherwiſe devour the fineſt of your fruit; eſpecially your grapes.

The beſt method indeed of ſecuring the latter, is to put the fineſt and ripeſt bunches into bags made for that purpoſe; theſe will be an effectual ſecurity both againſt inſects and birds.

Your figs will alſo require phials of ſweetened water to be hung up in different parts of the trees; for waſps, hornets, flies, &c. are very fond of this fruit.

Gather Appels and Pears.

Many ſorts of your apples and pears will be fit for gathering about the middle or latter end of this month.

But remember to let this work be done in dry weather, and when the fruit are perfectly dry, otherwiſe they will ſoon rot. They will begin to drop apace from the trees, when they have attained their full maturity; and whenever this happens, let the fruit be gathered.

Make Preparations for Planting.

Towards the latter end of this month, you may begin to prepare the ground where you intend to make new plantations.

If an entire new border for wall-trees be deſigned, let the ground be prepared in the manner mentioned in the introduction to this Kalendar.

The PLEASURE or FLOWER-GARDEN.

Sow Anemone and Ranunculus Seed.

It is not yet too late to ſow anemone and ranunculus ſeed, provided it be done at the beginning of the month.

In order to this, let ſome pots, boxes, or tubs, be filled with rich light earth, and the ſurface laid very even. Sow the ſeed, each ſort ſeparate, pretty thick on the ſurface, and cover it with light fine earth about a quarter of an inch thick.

Sow the Seeds of Bulbous-rooted Flowers.

The ſeeds of tulips, hyacinths, crown imperials, fritillarias, and many other bulbous-rooted flowers, may yet be ſown either in beds or boxes; for they will ſucceed in either.

The earth muſt be rich and light, broken very fine, and the ſurface laid very ſmooth and even.

When the earth is thus prepared, let the ſeeds be ſown on the ſurface, each ſort ſeparately, and covered with light ſifted earth about half an inch thick.

Sow Auricula Seed.

You may ſtill ſow the ſeeds of auriculas in large pots or boxes, filled with rich earth, broken very fine, and the ſurface made very ſmooth and even.

The ſeed ſhould be ſown pretty thick on the ſurface, and covered with light rich earth about a quarter of an inch thick.

As ſoon as the ſeeds are ſown, the pots or boxes ſhould be placed out of the reach of the mid-day ſun, till towards the latter end of the month, and then removed into a warmer ſituation.

Propagate Fibrous-rooted Plants.

This is a proper ſeaſon for increaſing roſe campion, ſcarlet lychnis, campanulas, catch-flies, and other fibrous rooted plants by ſlips.

Theſe plants generally grow in tufts; and where this happens, let the whole be entirely taken up, parted, and ſome of the beſt ſlips planted again in the borders where they are to flower; while the ſmaller ſlips are planted in a nurſery bed to get ſtrength: remember to water them as ſoon as planted.

In the ſame manner you may part the roots of daiſies, polyanthuſes, double chamomile, thrift, gentianella, ſaxifrage, and London pride. Let theſe likewiſe, where they are increaſed to large bunches, be taken up, divided, and then planted in a ſhady border, about five or ſix inches aſunder.

The double rocket, double ragged robin, double batchelor's button, double feverfew, leonurus, bell-flower, and all other fibrous-rooted plants that are paſt flowering, may now be propagated by parting their roots; but it will be better if done about the beginning of the month.

Tranſplant Pionies, and other knot-rooted Plants.

This is a proper ſeaſon for tranſplanting pionies, the different ſorts of flag iriſes, monkſhood, fraxinella, and other plants of that kind.

The roots are to be taken up and parted, and then planted again in places where they are to continue.

Tranſplant hardy Shrubs and Trees.

You may begin, about the latter end of this month, to tranſplant moſt kinds of hardy ſhrubs and trees; for they will then ſucceed, and have time ſufficient to take good root before the cold weather comes on. But remember to give them a plentiful wetering as ſoon as tranſplanted.

Plant Hyacinth and Tulip Roots.

About the latter end of this month will be a proper time for planting your choice hyacinth and tulip roots.

In order to which, let beds be prepared at leaſt a fortnig ht before the roots are planted; eſpecially if you ſtir the earth to the depth of two feet, as is often practiſed by thoſe who are curious in theſe kinds of flowers. But if this be thought too much, let the ground be dug one ſpade deep and one ſhoveling, and, at the ſame time, the ſoil remarkably well broken and divided.

When the ground is thus prepared, let it be parted into beds three feet and a half or four feet broad, laying the earth in a rounding form, higheſt in the middle.

Four or five rows of theſe roots are then to be planted in each bed, allowing nine inches between row and row, and the ſame diſtance between the roots; for nothing is of greater advantage to theſe flowers, than giving them ſufficient room.

It will be neceſſary to bury theſe roots ſo deep in the ground, that their crowns may be at leaſt four or five inches below the ſurface of the bed.

Plant Ranunculuſes and Anemones.

About the middle or latter end of this month it will alſo be time to prepare the ground for planting the fineſt ſorts of your anemones and ranunculuſes.

If you intend theſe roots in beds by themſelves, let the beds be about three feet and a half or four feet broad, laying them ſomewhat rounding, as was mentioned above with regard to thoſe intended for hyacinths and tulips.

When the beds are ready, let the roots be planted in them at ſix inches every way from one another; and about two or three inches deep.

The above diſtances are conſiderably greater than what is commonly allowed for theſe flowers; but room is of the utmoſt advantage to them; for the flowers will be much larger, and ſhow themſelves to much greater advantage, than when they are placed cloſer together. At the ſame time they will produce much larger off-ſets, and conſequently increaſe much faſter.

Plant Box.

About the middle of this month is a very proper ſeaſon for beginning to plant box, where new edgings are wanted, for it will then take root freely; but remember to give the box a plentiful watering as ſoon as the edgings are planted.

This is alſo a very proper time for repairing any box edgings formerly planted; or removing them where they have grown thick and clumſy. In order to which, the edging ſhould be wholly taken up, the roots parted, and a proper quantity of the box be ſlipped, trimmed, and immediately planted down again in a cloſe but thin edging.

In a month after planting the box will be well rooted, and the edgings will appear neat during the whole winter.

Tranſplant Carnations, and other Perennial Plants.

Towards the latter end of this month, ſome of your ſtrongeſt carnations, pinks, ſweet-williams, ſeedling wall-flowers, ſtock-july flowers, columbines, and other perennial plants, ſown in June, or beginning of ſummer, may be tranſplanted into the borders.

But it will be proper to take the advantage of dripping weather for tranſplanting them at this ſeaſon.

At the ſame time many of thoſe which were pricked out from the ſeed-bed into nurſery beds, two or three months ago, may now be ſafely taken up with balls of earth about their roots, and planted where they are intended to remain. By this practice the plants will hardly feel their removal. But do not forget to give each plant as ſoon as removed a moderate watering; for this will at once nouriſh the plants, and cloſe the earth about their roots.

Management of Carnation Layers.

Your carnation layers muſt now be taken care of. If any of them ſtill remain on the old plants, let them be tranſplanted ſome time before the middle of the month, that they may have time to take good root before the winter.

You may plant the choiceſt kinds of theſe layers in ſmall pots, in order to their being more eaſily protected during the ſevere weather in the winter. But the common ſorts may be planted in nurſery-beds in a warm ſituation; and ſome of the ſtrongeſt layers may be planted out at once into the borders where they are intended to flower.

With regard to thoſe layers that were planted in pots or beds during the former month, let them be watered now and then, if the weather proves dry; and be ſure to keep them entirely free from weeds.

Management of Auricula Plants in Pots.

All your auricula plants in pots will now require attention, particularly thoſe that were ſhifted laſt month. If the weather proves very dry, they muſt be moderately watered now and then: on the contrary, if a great deal of rain falls, they muſt be defended from it; for too much wet will rot their roots.

Let therefore the pots containing your choicer plants be placed together in a bed arched over with hoops; and when the weather is exceſſively wet, let thick mats or canvas be drawn over the hoops to defend the plants. By this method the plants will be much better protected from wet than by that commonly made uſe of, namely, to lay the pots down on one ſide. But if a convenience of this kind cannot be had, the pots muſt be laid down on one ſide, that the plants may not receive too much moiſture, which would deſtroy them.

Clear away decayed Flower Stalks.

Remember to go round your borders frequently, cutting down the ſtems of ſuch plants as are paſt flowering: theſe ſhould never be ſuffered to ſtand long after their bloom is over, for dead ſtems have very unſightly appearance among plants, whether growing or in bloom.

Trim flowering Plants.

Examine frequently your plants in general, and cut off all ſtraggling or irregular branches, together with thoſe that are weak and dangling, and all dead or damaged leaves.

At the ſame time tye up to ſtakes ſuch plants as have been thrown down by the winds or too much wet. This will give an air of neatneſs to the whole, and greatly improve the elegant appearance of your flowering plants.

Cut Box Edgings.

If you omitted to clip your box edgings during the two preceding months, let it be done now, and the

ſooner

ſooner the better, that the box may have time to recover, before the winter comes on.

Clip Hedges.

All your hedges that ſtill remain unclipped, muſt now be finiſhed; nor ſhould it be deferred beyond the middle of the month, for the ſhoots will ſoon acquire too great a degree of hardneſs.

Remember to keep your ſheers in the beſt order; for otherwiſe the work will be tedious, and badly performed.

Let the ſides of the hedges of all ſorts be trimmed as ſtraight as poſſible, and in ſuch a manner, that the hedge may run ſomewhat tapering from the bottom to the top; for the former ſhould always be boarder than the latter. With regard to the top, the utmoſt care ſhould be taken to cut it very ſtraight and even.

Clean Borders.

Take particular care to keep your borders, eſpecially thoſe near the principal walks, always very neat and clean. Neither weeds, dead leaves, nor any other litter ſhould ever appear on thoſe borders.

Mow Graſs walks and Lawns.

Let your graſs walks and lawns be mowed frequently, otherwiſe they will have a diſagreeable appearance; nor will it hardly be poſſible to mow the graſs with any degree of truth, if it be once ſuffered to grow very rank and rough.

Remember alſo to keep the edges of all the graſs, bordering upon gravel walks, very cloſe and neat. Theſe edges ſhould be cut once a fortnight during the ſummer ſeaſon.

Roll Gravel Walks.

It will be neceſſary, if you would have your gravel walks look well, to roll them at leaſt twice a week. Nor ſhould you ſuffer any weeds or other litter to be ſeen upon them.

OCTOBER.

Work to be done in the KITCHEN-GARDEN.

Cauliflower Plants.

THOSE cauliflower plants which were planted laſt month under frames, ſhould about the latter end of this month, be planted out under hand or bell-glaſſes; but unleſs the weather ſhould prove very wet and cold, they need not be covered at all with the glaſſes; and even in the day-time of heavy rains, let the plants have air by tilting up the glaſſes.

During the laſt week of this month, ſome of your beſt cauliflower plants ſhould be removed into the place where they are to remain. But as they are to be covered with hand or bell glaſſes, two or three of the plants are to be put under each glaſs.

The ground for theſe plants ſhould be rich and light, ſituated in a warm part of the garden, where water is not apt to ſtand in winter.

Before the ground is dug, let ſome good rotten dung be ſpread upon the ſurface, and then dug ſpade deep, taking care to break the clods very well, and to bury the dung equally.

When this is done, let the ground be divided into beds three feet wide, allowing a foot and a half between the beds for the conveniency of putting on, raiſing, or taking off the glaſſes.

The beds being thus laid out, ſtretch your line along the middle of each bed from one end to the other, and at every three feet put in two or three plants, within four or five inches of each other, and cloſe the earth well about their roots and ſtems, giving them a moderate watering to ſettle the earth about their roots.

As ſoon as the planting is finiſhed, bring your hand or bell-glaſſes, and place one of them over each clump of plants every night, removing them in the morning while the weather continues mild and dry.

But when the weather is extremely wet, the glaſſes muſt not be taken entirely off; they muſt be only raiſed two or three inches on the warmeſt ſide, and ſupported in that poſition with props, to admit air to the plants: in froſty weather they muſt be kept cloſe.

If you have not hand or bell-glaſſes, you may remove ſome of your plants into a warm border, where they will, if the winter be mild, produce tolerable heads in the ſpring.

Cabbage Plants.

A few of your early cabbage plants may be removed into the beds where they are to cabbage next ſummer, about the middle or latter end of the month.

In order to this, let ſome good rotten dung be ſpread over the ſurface, and the ground dug one ſpade deep, remembering to bury the dung properly in the bottom of the trench.

When the ground is ready, let the plants be ſet in rows two feet aſunder, and the ſame diſtance apart in the rows.

As it often happens that cabbage plants removed early into an open expoſure, are, in ſevere winters, killed by the froſt, it will be prudent to let ſome of the early cabbage plants remain in nurſery beds made in a warm ſituation, till January or February, that you may have plants to ſupply any defects in the former, or even to form new plantations.

Let therefore all your cabbage plants that ſtill remain in their ſeed-beeds, be now removed into nurſery-beds at the beginning of this month, that they may have time to get ſtrength before the ſevere weather begins. And remember to let the beds be made in a warm ſituation, and to ſet the plants about five or ſix inches aſunder.

Brocoli.

Let the ground between and about the brocoli plants which were ſet late be looſened with a hoe, and ſome of the earth drawn up about their ſtems; for this will be of the utmoſt advantage to them, provided it be done early in the month.

Beans.

Beans.

A few mazagan beans may be planted any time this month, for an early crop in the ſucceeding ſummer.

But remember to plant them in a warm border under a ſouth wall or other fence, in rows two feet and a half aſunder, dropping the beans two or three inches apart in the rows.

Many gardeners in planting early beans, chooſe firſt to ſow the beans pretty thick in a bed of rich earth, and tranſplant them into the borders when they are come up to a ſufficient height. The method is this:

Let a bed of good rich earth, about four feet broad, ſituated in a warm corner of the garden, be well dug. Then draw off the ſurface of the earth to the depth of an inch and an half, or two inches, from every part of the bed equally. This being done ſcatter the beans about an inch aſunder, and immediately cover them with the earth drawn off the bed.

When the beans are come up, and grown about two inches high, they ſhould be tranſplanted in mild weather into warm borders, in rows two feet and a half aſunder, and two or three inches apart in the rows. Remember to cloſe the earth well about their roots, and there will be no danger of their growing freely.

Experience has ſhewn, that beans tranſplanted in the above manner, will come a week or ten days ſooner than thoſe planted in the place where they are to remain; provided both are ſet the ſame day.

At the ſame time there will be leſs danger of their being injured by the froſt, as they may, from being crowded together in the ſeed-bed, be more eaſily protected by covering them when the weather is very ſevere.

Peas.

About the firſt or ſecond week in this month, a few peas ſhould be ſown for an early crop. The earlieſt hotſpur is the moſt proper ſort to be ſown at this ſeaſon; but remember to make choice of ſuch ſeeds as are plump and ſound.

They ſhould be ſown in a warm border under a ſouth wall, in drills two feet aſunder, and the peas placed pretty cloſe together in the drills, but as regular as poſſible, and covered immediately with earth an inch and a half or two inches deep.

Lettuces.

Thoſe lettuces which were ſown about the middle of September, in order to be covered with frames or hand-glaſſes, ſhould be removed, about the middle of this month, into the places where they are to remain.

In order to this, a ſpot of light rich earth, in a warm ſituation, and fully expoſed to the mid-day ſun, ſhould be choſen, and a bed proportioned to the ſize of a cucumber or melon frame marked out; the ſurface laid ſomewhat ſloping to the ſun, and raked very ſmooth and even.

When the bed is thus prepared, let the lettuces be planted not too deep in the earth, about two inches diſtant every way. Let them have a little water as ſoon as planted and let the ſurface between the plants be made perfectly ſmooth.

The plants being thus ſet in the bed, put on the frame, and, when the weather is wet and froſty, cover it with the lights. By this precaution there will be no doubt of theſe plants ſurviving the cold of winter, notwithſtanding thoſe which were planted in borders are deſtroyed.

About the middle of this month will be alſo a very proper time to tranſplant thoſe lettuces which were ſown about the latter end of Auguſt or the beginning of September into the places where they are to remain.

But you muſt remember to chuſe a warm border for their reception; and then, if the weather proves mild, they will cabbage early in the ſpring.

Spinage.

Remember to keep your winter ſpinage perfectly clean from weeds; for if the latter are ſuffered to grow at this ſeaſon of the year, they will ſoon overrun, and totally deſtroy the plants.

If you neglected to thin your ſpinage laſt month, let it be done at the beginning of this; remembering to clear away the weaker, and to leave the ſtronger plants at the diſtance of four or five inches from one another.

Endive.

You muſt remember, provided the weather be dry, to tye up ſome endive plants every week for blanching.

In order to this, let ſuch plants be choſen as are quite or nearly full grown; to let the leaves be regularly and cloſely gathered up in the hand, and tyed neatly together with a piece of ſtrong baſs.

At the ſame time let the earth be drawn up round each plant almoſt to the tops of the leaves; for this will at once promote the blanching, and render the plants exceedingly white and tender.

Earth up Celery.

As your celery plants advance in height they muſt be duly earthed up, that they may be thoroughly branched before they are attacked by ſevere froſts.

Let therefore every advantage of dry weather be taken, in order to earth them up to a proper height. At the ſame time remember to break the clods of the earth very well, and to lay it up to the plants, without breaking their leaves or burying their hearts.

Earth up Cardoons.

Remember to earth up your Cardoons when both the weather and the leaves of the plants are dry, in the manner mentioned the foregoing month.

Sow Carrot Seed.

About the laſt week in this month, a little carrot ſeed ſhould be ſown on a warm border; as it is very probable a few of the plants, at leaſt, will ſurvive the froſt, and conſequently produce young carrots very early in the ſpring

Sow Radiſh Seed.

A little radiſh ſeed ſhould alſo be ſown about the middle of the month, in a warm border; for if the weather be any thing mild, the plants will be fit for drawing early in the ſpring. Let the ſeed be ſown pretty thick, and raked in with an even hand.

Sow ſmall Sallad Herbs.

A ſmall quantity of the ſeeds of muſtard, creſſes, radiſh, rape, and lettuce, ſhould be ſown every week; but that ſown about the latter end of the month ſhould be defended by a frame and glaſſes.

In order to this, let a bed of light rich earth, in a warm ſituation fronting the ſouth, be dug, and proportioned to one of the ſhalloweſt garden frames. Let the earth be broken very fine, and laid a little ſloping towards the ſouth.

When the ſurface is raked very even, let ſhallow drills be drawn from the back to the front of the frame, about two or three inches aſunder. In theſe drills let the ſeed be ſown pretty thick, and covered with earth about a quarter of an inch deep.

The glaſſes muſt be put on every night, and continued alſo in the day-time, when the weather is very cold or wet.

Dreſs Aſparagus Beds.

The ſtalks of your aſparagus muſt be cut down, and the beds properly dreſſed ſome time this month.

Remember to cut down the ſtalks or haulm within two or three inches at leaſt, of the ſurface of the beds, and immediately to carry it off the ground.

When this is done, cut up all the weeds with a ſharp hoe, and draw them off into the alleys, which are to be marked out with a line and ſpade, about eighteen or twenty inches wide.

The beds being thus cleared, let the alleys be dug one ſpade deep, ſpreading the earth, or at leaſt the greater part of it, neatly over the beds, obſerving, as you advance in digging, to bury the weeds taken off the beds in the bottom of the trench, and to cover them a proper depth with earth.

If you intend to manure your aſparagus beds, this is alſo the proper ſeaſon to do it; but the dung, which muſt be applied before the alleys are dug, ſhould be very good and very rotten. None is more proper than the dung of old cucumber and melon beds. This muſt be ſpread over the ſurface, as the haulm and weeds are cleared away: let it be well broken, and laid of an equal thickneſs on every part of the beds. When this is done, let the alleys be dug as above directed, and a proper quantity of the earth ſpread upon the dung.

You may plant a row of cabbages or coleworts in each alley, five or ſix inches apart in the row. And theſe will generally ſurvive very ſevere froſts, when all thoſe planted in an open or level ſpot will be deſtroyed.

Clear the beds of Aromatic Plants.

Your beds of ſage, ſavory, thyme, hiſſop, mint, baum, tarragon, tanſey, ſorrel, &c. muſt now be dreſſed in the following manner:

Let all the ſtalks, or decayed flower ſtems, be cut cloſe to the heads of the plants, or the ſurface of the ground; the beds well cleared from weeds and other litter, and the whole carried off the ground.

When this is done, let the earth be dug lightly between ſuch of the plants as will bear it, either with a ſpade or trowel. At the ſame time let the alleys be dug, and a little of the earth ſpread upon the beds. If a little rotten dung had been ſcattered over the beds before they had been dug, it would have been of great advantage to the plants.

The beds of mint and pepper-mint, will not admit of digging; but let them be well cleared from weeds, a little rotten dung ſpread over the ſurface, and ſome of the earth from the alleys thrown over the dung.

By this means the roots will, in ſome meaſure, be protected from the froſt; and the rain, by waſhing down the ſalts in the dung and earth, will greatly enrich the beds, and ſtrengthen the plants.

Dung and trench Ground.

The parts of the kitchen-garden now unoccupied ſhould be dunged and trenched, that it may receive every poſſible advantage from the ſun and air. By this means the ſoil will be greatly enriched, and conſequently produce much larger crops in the ſpring, than it would if ſuffered to have lain neglected till it was wanted.

The Nursery.

Sow Haws, Holly Berries, &c.

This is the ſeaſon for ſowing haws, holly, hips, and yew-berries.

In order to which, let beds of three feet and a half, or four feet wide, be prepared: the berries of each ſort ſeparately ſown on the ſurface, and covered near an inch deep with earth.

Many bury their haws and holly-berries a whole year in the earth, before they ſow them, for they ſeldom come up before the ſpring twelvemonth after they are ſown. The method is this:

They mark out in ſome part of the nurſery, where the ground is firm and dry, a trench about two feet wide, dig it twelve inches deep, and make the bottom very even and level. In this trench they lay the berries of an equal thickneſs and cover them with earth ſix inches deep, at leaſt.

In this manner they are ſuffered to lie a twelvemonth, when they are taken up and ſown in beds as above directed.

Sow Acorns.

About the latter end of this month your acorns muſt be ſown, for, if kept much longer out of the ground, they will begin to ſprout.

They ſhould be ſown in beds about four feet wide, and covered an inch deep with earth.

Sow Plum-Stones.

This is a very proper ſeaſon for ſowing plum-ſtones, to raiſe a ſupply of ſtocks for the purpoſe of budding and grafting.

In order to this, let beds about four feet broad be dug, the ſtones ſpread, not too thick, as equally as poſſible on the ſurface, and covered a full inch deep with earth.

If you ſcatter ſome dry ſhort litter over the ſurface of the beds as ſoon as they are planted, it will prove of great ſervice.

Some preſerve theſe ſtones till about the middle of February, and then plant them in beds as above directed. The method they take to preſerve the ſtones is this:

They procure a ſtrong cloſe box or tub, and cover the bottom three inches deep with ſand. When this is done, they ſcatter on it a parcel of the ſtones, covering them two inches deep with ſand; upon this covering they ſcatter another parcel of the ſtones, covering them in the ſame manner, and ſo proceed till the tub or box

is

is full. By this artifice the vegetative faculty of the ſtones is preſerved, and they may be ſown any time in February, when the weather is favourable.

Sow Beech-maſt, &c.

This is the beſt ſeaſon in the whole year for ſowing beech-maſt, and maple ſeed.

Let therefore a bed four feet broad be prepared for each of theſe ſeeds; the earth well broken, and the ſurface laid very ſmooth.

When this is done, let the ſeeds be ſown pretty thick on the ſurface, and covered with earth about an inch deep.

Propagate Trees and Shrubs by Layers.

About the middle of this month, you may begin to propagate the hardier kind of foreſt trees, and flowering ſhrubs, by layers. The method is this:

Dig the ground round the tree or ſhrub you intend to propagate. When this is done, bring the branches down, lay them in the earth, and faſten them down with forked or hooked ſticks. Then cover the body of the ſhoots three or four inches deep with earth, leaving the tops three or four inches above the ground.

Limes, elms, and other foreſt trees, will ſucceed extremely well by this method; but it will be neceſſary to cut down the tree, from which the layers are intended to be taken, near the ground, that it may produce ſhoots or branches at a height proper for this operation.

Propagate Trees and Shrubs by Cuttings.

Many of the hardy kinds of trees and ſhrubs may be propagated by cuttings; and this is a very proper ſeaſon for doing it.

Honey-ſuckles, gooſberry and currant trees are better raiſed by cuttings than by any other method. The manner of performing this operation has been fully deſcribed in the work of the nurſery for laſt month.

Tranſplant Layers.

Thoſe layers which were laid down laſt year muſt now be taken off, and planted in an open ſpot of ground, in rows eighteen inches aſunder, and twelve inches apart in the rows.

Tranſplant hardy Trees and Shrubs.

You may, any time this month, tranſplant all ſorts of hardy trees and ſhrubs; and by next ſummer they will have fixed themſelves firmly. This will be of great advantage; for they will require very little trouble in watering.

Tranſplant Stocks to Bud and Graft upon.

This is a very proper ſeaſon for tranſplanting all kinds of ſtocks intended for budding or grafting the different ſorts of fruit upon.

They ſhould be planted in rows two feet and a half aſunder, and twelve or fifteen inches be allowed between the ſtocks in each row.

Tranſplant Laurels.

Laurels, Portugal laurels, lauruſtinus, and other evergreens of that kind, may be tranſplanted with ſafety at the beginning of the month.

The FRUIT-GARDEN.

Prune and Nail Peach, Apricot, and Nectarine Trees.

As ſoon as the leaves of your peach, apricot, and nectarine trees are dropped, which will happen about the latter end of this month, you may begin to prune and nail them.

Remember to unnail the greater part of the ſmall branches, before you begin to prune; becauſe you will have room to uſe your knife with greater facility, and, at the ſame time, may examine with more convenience the ſeveral ſhoots, and conſequently be better able to judge which are proper to be taken off, and which to remain.

You muſt be careful to leave at equal and regular diſtances, and in every part of the tree, a proper ſupply of the laſt ſummer's ſhoots, that every part of the wall, from the bottom to the top of the tree, may be regularly furniſhed with them; for theſe, and theſe only, are the ſhoots that will bear the fruit next ſeaſon.

At the ſame time, remember to cut out all the old wood, as it becomes uſeleſs; we mean ſuch branches as advance a great way, and are not furniſhed with young wood.

But though a ſufficient number of the young ſhoots are to be left, yet they muſt not be crowded, or left too cloſe together. Let them therefore be carefully examined, and where you perceive they ſtand too thick, let ſome of them be taken away. In doing this, remember to leave the moſt promiſing and beſt placed ſhoots for the purpoſe of bearing, and to leave them at due and regular diſtances from one another; five or ſix inches will be a proper interval between them, if the tree be in good health. Thoſe which you take away muſt be cut off cloſe.

When you have taken away all the uſeleſs ſhoots, you muſt ſhorten thoſe you intend to preſerve; for by this means they will next ſummer produce, beſides their fruit, a proper ſupply of bearing ſhoots for the year after.

But, in doing this, remember to ſhorten every one in proportion to its growth, and original length: for inſtance, a ſhoot of about twelve inches muſt be reduced to about eight inches, one of fifteen or ſixteen to ten, and a ſhoot of twenty to fourteen; and ſo on in proportion to their different lengths. In a word, you ſhould cut away about one third of the length of every ſhoot.

A difference muſt, however, be made with regard to thoſe nectarine and apricot trees which produce very ſtrong and vigorous ſhoots; for theſe muſt be left about five or ſix inches aſunder, and not more than one fourth of their original length muſt be cut off; indeed ſome of the moſt vigorous ſhoots ſhould be but very little ſhortened, and others not at all. For the more wood you cut out of a vigorous tree, and the more the ſhoots are ſhortened, the more vigorouſly will the tree ſhoot. This, therefore, is the only method of pruning a vigorous ſhooting tree, in order to its producing ſuch moderate ſhoots as are neceſſary for their bearing fruit.

If the above obſervations be well underſtood, the gardener will be at no loſs in pruning apricot, peach, and nectarine trees, in proportion to their different growths.

But it will be neceſſary to obſerve, that where any of the ſhoots left to bear have produced any ſmall ſhoots from their ſides, they muſt be cut off cloſe to the principal ſhoot; for theſe will be entirely uſeleſs; they will produce neither good wood, nor good fruit.

In ſhortening the bearing ſhoots, you ſhould remember to cut them off at a leaf bud, or, as ſome call it, a double bud, if poſſible. A leaf, or double bud, is where two buds appear upon the ſame eye. Every one of theſe eyes will generally produce a good ſhoot next year; it is therefore neceſſary, in ſhortening the ſhoots, to cut them at or near ſuch an eye, in order that each may produce a good ſhoot next year for its leader; for where there is a fair leading ſhoot produced at or near the extremity of a bearing branch, ſuch a ſhoot will generally yield fair and well taſted fruit.

With regard to the apricot tree, in particular, it ſhould be obſerved, that there are often on the two years old branches ſhort ſhoots, or natural ſpurs, about an inch or two in length, and, frequently, on each of theſe ſpurs ſeveral bloſſom buds. Some cut theſe ſpurs entirely away; but this is bad practice; for they generally produce handſome and well taſted fruit. But, at the ſame time, ſuch only of theſe ſpurs which are well placed, and promiſe, by their bloſſom buds, to bear fruit, ſhould be ſpared; ſuch as advance conſiderably in a foreright direction, together with ſuch as are deſtitute of bloſſom buds, ſhould be cut off cloſe to the branch.

Remember, as ſoon as you have finiſhed pruning one tree, to nail it cloſe to the wall in a proper manner, before you begin the next; and not leave it, as many do, till all the trees on the wall are pruned. Some, indeed, direct them to be left unnailed till March; but by this method many of the branches will be injured by the winds, and the bloſſom buds ſo much ſwelled by the time of nailing them, that many of them will unavoidably be diſplaced in the operation.

You ſhould obſerve great exactneſs in nailing your trees: the branches muſt not any where be nailed acroſs one another; but every branch laid in entirely clear of the reſt, and about four, five, or ſix inches diſtant, according to the condition of the tree. At the ſame time, let all the branches be laid perfectly ſtraight, and cloſe to the wall.

Tranſplant Fruit Trees.

Moſt ſorts of fruit trees may be ſafely tranſplanted about the latter end of this month.

In the introduction to this Kalendar, we have given full directions for making borders, and mentioned the diſtances that are neceſſary between the trees of different ſorts of fruit, and therefore it will be needleſs to ſay any thing on that ſubject here.

Propagate Gooſeberry and Currant Trees by Cuttings.

This is a very proper ſeaſon for propagating gooſeberry and currant trees by cuttings; and it ſhould be remembered, that the trees raiſed from cuttings always produce larger and better taſted fruit, than thoſe which are raiſed from ſuckers.

Theſe cuttings muſt be ſhoots of the laſt ſummer's growth, taken from healthy trees, and ſuch as are remarkable for bearing the fineſt fruit of their kind.

When a proper number of theſe ſhoots are provided, let them be ſhortened to about ten, twelve, or fifteen inches in length; and planted in a ſhady border, in rows acroſs the border, ten or twelve inches aſunder. Each cutting muſt be ſet near half its length into the earth.

Prune Gooſeberry and Currant Trees.

About the latter end of this month, your gooſeberry and currant trees may be pruned. In doing which, obſerve to keep their branches thin, and at regular diſtances from one another. The heart of the trees alſo muſt be kept open and free from wood, and the branches no where ſuffered to croſs one another.

At the ſame time, remember to take away all ſuckers from the roots, and to train up each tree with a ſingle ſtem.

It is natural for theſe trees to produce numbers of young ſhoots every ſummer, many of which ſhould be now taken away; but be ſure to leave, at proper diſtances, ſome of the beſt placed, and moſt regular grown ſhoots, for a ſucceſſion of young bearing wood, to ſupply the place of ſuch branches as are paſt bearing good fruit; remembering, at the ſame time, to cut ſhorter, or remove entirely, ſome of the older branches, in order to make room for thoſe which are young, and promiſe to bear better fruit.

You ſhould alſo remember, in ſhortening the laſt ſummer's ſhoots, not to cut off more than one third of their length; and where the ſhoot is very vigorous, one fourth will be ſufficient; for if they are ſhortened much more than this, their vigour will be ſo greatly encreaſed, that they will next year fill the tree with ſo many uſeleſs ſhoots as will prove prejudicial to the fruit.

Tranſplant Gooſeberry and Currant Trees.

About the middle, or towards the latter end of this month, will be a proper ſeaſon for tranſplanting gooſeberry and currant trees.

If theſe ſhrubs are intended to be ſet in a ſpot by themſelves, let them be planted in rows eight feet aſunder; and let ſix feet, at leaſt, be allowed between plant and plant in the rows. This will give room to dig and hoe the ground between the ſhrubs; and the berries will grow very large, and ripen properly.

But if they are intended to be ſet in ſingle rows round the quarters of the kitchen garden, they ſhould be planted eight or nine feet diſtant from one another.

Plant Strawberries.

Where new plantations of ſtrawberries are wanting, they may be made any time this month, but the ſooner the better.

In order to this, let ſome of the beſt rotten dung be ſpread over the ſurface of the ground where you intend to plant your ſtrawberries, and then neatly dug, remembering to bury your dung in a proper manner.

When the piece is thus prepared, let it be divided into beds four feet broad, leaving an interval of eighteen inches for an alley between the beds, and rake the ſurface very ſmooth.

The beds being thus in readineſs, chuſe a parcel of the ſtrongeſt plants produced laſt ſummer, and take them up with good roots. Cut off all the runners,

pull off all the dead leaves, trim the roots, and plant them in four rows length-ways of the bed. Conſequently the rows will be one foot aſunder; and the ſame diſtance ſhould be allowed between each plant in the rows.

Remember to cloſe the earth well about every plant, and to give each of them a little water as ſoon as they are ſet.

Dreſs Strawberry Beds.

It will be neceſſary to give your ſtrawberry beds their winter's dreſſing ſome time this month; but remember to chooſe a dry day for it. The manner is this:

Clear away all the runners or ſtrings cloſe to the head of the plants; clean the beds from weeds, and let all the litter be carried away.

When this is done, let the earth in every bed, where there is room, be looſened with a ſmall ſpade, trowel, or hoe, taking care not to diſturb the roots. Then mark out with your line the alleys of their proper width, and dig them immediately, ſpreading ſome of the earth carefully over the beds; taking particular care to lay it neatly between, and cloſe about every plant.

The plants ſhould never be ſuffered to ſpread over the whole ſurface of the bed; they ſhould be kept, as it were, in ſingle bunches or heads. And by purſuing this method you will every year, when the ſeaſon is kind, have a great quantity of large and well taſted fruit.

Plant Raſpberries.

This is a very proper ſeaſon for making new plantations of raſpberries; but the ſpot intended to be planted muſt be in an open ſituation, and the ground good.

The plants muſt alſo be well furniſhed with roots, or they will not ſucceed: let therefore ſuch only be choſen.

Being furniſhed with a proper number of ſuch plants, let the ſhoots be ſhortened a little, and only one ſtrong ſhoot left on each root. The extremities of the roots alſo muſt be trimmed, and then planted in rows four feet aſunder, and the plants ſet three feet apart in the rows.

Prune Raſpberry Plants.

Experience has ſufficiently ſhewn that three only of the laſt year's ſhoots ſhould be left upon each root for bearing fruit the next year; theſe muſt therefore be allowed room; and, in order to this, all above that number on each root muſt be now removed. In doing this let them be cut off cloſe to the ſurface of the ground; cutting away at the ſame time all the old wood, together with all the ſtraggling branches between the rows.

When this is done, let each of the branches left to bear fruit the ſucceeding year be ſhortened, cutting off about one third or one fourth, in proportion as the ſhoot is leſs or more vigorous, of its original length.

When this is done, and all the cuttings, &c. cleared away, let the ground in the intervals and between the roots be dug, clearing away all the ſtraggling roots between the rows, together with thoſe that do not belong to the ſtanding plants.

Gather Winter Apples and Pears.

This is generally the ſeaſon for gathering winter apples and pears. But they will be ripe at different times; ſome at the beginning, ſome about the middle, and others not till the latter end of the month.

In order to know whether the fruit are proper to be pulled, try ſeveral of them in different parts of the tree, by turning them gently upwards: if they quit the tree eaſily, it is time to gather them; if not, they muſt remain ſome time longer.

You ſhould not, however, let any of your fine eating pears hang on the trees after the middle of the month, eſpecially if the nights are inclinable to be froſty; for if they are once touched with the froſt, many of them will rot before they are fit for the table, notwithſtanding all the care that can afterwards be taken of them.

Nor muſt any kinds of apples or pears be ſuffered to hang longer on the trees than the latter end of the month; for after that time they will get no good by being abroad.

But whenever you gather any of your keeping fruit, let a dry day be choſen; and before you begin to gather, let both the fruit and leaves be thoroughly dry. Between eleven and twelve is generally the beſt time to begin; nor ſhould the work be continued after three or four in the afternoon.

Take care to pull your fruit one by one, and to lay them gently in a baſket; for if they are bruiſed by any means, they will ſoon be ſpoiled.

Carry the fruit as ſoon as they are gathered into the fruitery, or other dry place, laying them carefully in heaps, each ſort by itſelf.

In theſe heaps they muſt be ſuffered to lie a fortnight to ſweat; which will at once improve their flavour, and make them keep the better.

After ſweating in this manner, let them be wiped one by one, and laid up where they are to remain. Remember, in ſevere froſty weather, to cover them with clean new ſtraw.

The PLEASURE or FLOWER-GARDEN.

Management of Carnation Layers.

You muſt during the laſt week in this month remove your carnation layers, planted into ſmall pots during the two laſt months, into places where they can be readily defended in bad weather; a common garden frame will be very proper for this purpoſe; and if the earth be light and dry, let the pots be plunged into it up to the rims.

In this frame let the pots remain during the winter, obſerving when the weather is froſty or very wet, to cover them with the glaſſes; and when the cold is very ſevere, to throw mats over the glaſſes. But let them conſtantly enjoy the benefit of the open air, when the weather is dry and mild.

If you have not the convenience of a frame, let the pots be plunged in a bed of dry compoſt, arched over with hoops, and covered over with the mats or canvas in bad weather.

Management of Auricula Plants.

It is neceſſary to defend your auricula plants in pots from froſt and heavy rains. In order to which, many perſons think it ſufficient to lay the pots down on one ſide; but this is a very poor expedient, as ſeveral methods more effectual may be eaſily contrived.

A garden frame will anſwer the purpoſe with very little trouble, as the plants may be defended in bad weather.

weather by putting on the glaſſes. But if a frame cannot be ſpared, let the pots be placed cloſe together under a warm wall, and arched over with hoops, that when the weather is very wet or froſty, canvas or mats may be thrown over them.

But whatever method be taken for the ſecurity of theſe choice flowers, let all the dead leaves be taken from the plants, and the earth near the ſurface looſened.

Plant Tulips and Hyacinths.

It is not yet too late to plant tulips and hyacinths, but it ſhould be done ſome time this month.

Remember to dig the ſpot where you intend to plant them very well, and to lay the ſurface of the beds rounding, or in a convex form, in order to throw off the wet. The beds ſhould be four feet broad.

Five rows of roots ſhould be planted in a bed, about nine inches apart, and four or five inches deep. Remember to chuſe a dry day for ſetting theſe roots.

If you intend to ſet any of theſe roots in the borders among other flowers, let them be planted in clumps or patches, rather than in ſingle rows. In order to this, let a ſmall circle ſeven or eight inches diameter be drawn in the border, with your finger, and ſet one root in the center, and three or four round the circumference; and in that manner plant a clump at about every two or three yards diſtance. The flowers planted in this manner will make a much more pleaſing appearance in the flowering ſeaſon than they would, had they been planted in a ſingle row.

But the choiceſt flowers ſhould always be planted in beds by themſelves, becauſe they may be more eaſily ſheltered from too much rain, and alſo ſhaded from the ſcorching rays of the ſun, both of which would greatly impair their beauty.

Plant Ranunculuſes and Anemonies.

This is alſo a good ſeaſon for planting the roots of ranunculuſes and anemones; but remember to plant the choicer ſorts in beds by themſelves.

In order to which let the ground be well dug, and divided into beds four feet broad. In each of theſe beds let five rows of the roots be planted ſix inches from one another, and about two inches and a half or three inches deep. By allowing them this diſtance, which is greater than common, the roots will blow much ſtronger, and the flowers will appear to much greater advantage.

Remember to cover the beds where your fineſt are ſet, with peas-haulm, or other dry litter, in ſevere froſts.

With regard to the common ſorts of ranunculuſes and anemones, they may be planted in clumps in the borders, where they will make a very agreeable appearance in the ſpring among other flowers.

Plant Crocuſes and Snow Drops.

Let the crocus and ſnow-drop roots which were taken out of the ground in the ſummer be now planted in the borders, either in rows or in clumps. If in the former, the roots ſhould be ſet ſix inches apart.

But they will make a much finer appearance if planted in clumps or patches. In order to which mark out a ſmall circle about five or ſix inches diameter, and plant one root in the center, and four or five round the edge or circumference; two feet farther mark out another circle, and plant it in the ſame manner; continuing the ſame method to the end of the border.

Theſe roots ſhould never be planted above three inches deep; two and a half will, in general, be ſufficient.

Plant Narciſſuſes, Jonquils, &c.

Your narciſſuſes, jonquils, bulbous and Perſian iriſes, fritillarias, and other bulbous roots of that kind, which were taken up when their leaves decayed in ſummer, ſhould now be planted.

If they are intended to be ſet ſeparate in beds, let them be planted in rows eight or nine inches aſunder every way. But if they are to be planted in the common borders, let them be planted three or four together in a ſmall circle, allowing five or ſix feet between each circle or clump.

Plant Crown Imperials, Martagons, &c.

This is likewiſe a proper ſeaſon for planting your crown imperials, martagons, orange lilies, and other bulbous roots of that kind, which were taken out of the ground in the ſummer.

They ſhould be planted in rows in the middle of a bed or border, each ſort at ten or twelve feet diſtance from one another, intermixing them as you proceed; each root ſhould be about three feet diſtance from the next.

Plant Hardy Flowering Shrubs.

Roſes, honey-ſuckles, gilder-roſes, lilacs, laburnums, ſyringas, althæa frutex, jaſmines, privets, double bramble, flowering raſpberry, double bloſſom cherry, bladder and ſcorpion ſena, double flowering peach, almonds, mezereons, cornelian cherry, double hawthorn, ſcarlet horſe-cheſnut, ſhrub cinquefoil, ſumach, rock-roſe, cytiſuſes, acacia, and other hardy flowering ſhrubs may be now tranſplanted.

But remember to plant them at ſuch a diſtance, that each plant may have full room to grow and ſhew itſelf to advantage.

When it is intended to plant them in clumps, or quarters, let the plants in general be ſet at leaſt five or ſix feet diſtant from one another; and ſuch as are of a humble growth, let them not be planted promiſcuouſly among the tall growing plants, becauſe they would be wholly concealed from ſight. Let therefore the low growing plants be ſet towards the front, or outſide of the clump; and the taller the plants are, ſo much the farther back let them be planted.

Tranſplant fibrous-rooted Flowering Plants.

Roſe campions, ſweet-williams, campanulas, catchfly, rockets, batchelors buttons, double feverfew, ſcarlet lychnis, lychnidea, and other fibrous-rooted perennial plants, ſhould now be tranſplanted into the borders or places where they are wanted. And as theſe are nearly of the ſame height, they are very proper to be tranſplanted into the middle of the border. All theſe, eſpecially thoſe of the double kinds, make a very agreeable appearance at the flowering ſeaſon.

But you ſhould remember to plant ſome of your double roſe campions, double wall-flowers, double ſtock july-flower, double lychnis, double ſweet-williams, and the like, in pots; for as theſe flowers deſerve particular care, they ſhould be ſheltered in ſevere weather.

This

This is alſo a proper ſeaſon to ſlip and plant out where wanted, polyanthuſes, double daiſies, double camomile, violets, London pride, thrift, hepaticas, gentianella, ſaxifrage, and other low growing fibrous-rooted plants. And, as they are but low, they ſhould not be planted more than fifteen or ſixteen inches from the edge of the border.

Columbines, monkſhood, Canterbury bells, fox-gloves, tree primroſe, Greek valerian, ſcabiouſes, and the like plants ſhould now be planted into the middle of the beds or borders; for they grow from two to four feet high.

Carnations and pinks, both ſeedlings and layers, double walls, and double ſtock-july flowers, ſhould now be planted in the beds or borders.

But the Michaelmas daiſies, golden rod, everlaſting ſun-flowers, French honey-ſuckles, and holly-hocks, are much better planted in clumps among flowering ſhrubs, than in beds or borders, unleſs they are planted toward the further ſide; and then they ſhould be ſet fifteen or twenty feet diſtant from one another.

Plant Ever-green Trees and Shrubs.

You may now remove moſt ſorts of ever-green trees and ſhrubs; but the ſooner it is done in the month the better.

The arbutus, or ſtrawberry tree, laurel, Portugal laurel, lauruſtinus, pyracanthas, phillyreas, alaturnus, bays, ever green oaks, cytiſuſes, hollies and magnolias, may, particularly, be now removed with ſafety. Theſe ſhould all be planted in clumps, and four or five feet every way aſunder; for at that diſtance each plant will have room to ſhoot every way regularly, and form handſome heads. At the ſame time you will have room to hoe, dig, and cleanſe the ground about the ſhrubs, which will be of the greateſt advantage to them.

Tranſplant Pines, Firs, &c.

Pines, firs, cedars, junipers, and cypreſſes, may be ſafely removed any time this month.

Remember to chuſe for them a dry ſoil, and to open for every plant a hole wide enough to receive the roots freely every way; and when the holes are dug a proper depth, to let the ground be well looſened at the bottom.

When the holes are thus prepared, bring the plants, and after ſhortening the ends of their roots and cutting off all that are dead, broken, or damaged, place each plant upright in the hole; break the earth well, and throw it in equally, ſhaking the plant gently, that the earth may fall in cloſely among the roots and fibres. When all the earth is thrown in, tread the top gently round the plant, and give every one of them a little water.

But in planting the more tender ſorts of evergreens, the plants ſhould, if poſſible, be brought with balls of earth about their roots, and the plants ſet immediately in a hole prepared for their reception, with the balls of earth entire; and as ſoon as the hole is filled up, the ſurface ſhould be trod gently, and each plant have a proper quantity of water.

Trim Ever-greens.

Remember to go often at this ſeaſon round your plantations of ever-greens, reducing to order ſuch as are of an irregular growth. Let all the ſtrong ſtraggling branches be ſhortened; and where the trees interfere with one another, let the branches be ſhortened ſo that evety plant may ſtand ſeparate.

Tranſplant Foreſt Trees.

The oak, elm, beech, maple, aſh, lime, and plane-trees, may be tranſplanted with ſafety about the middle or latter end of this month. But remember to do it in mild weather, and in a dripping time.

Management of Seedling Flowers.

All your ſeedling flowers in pots or boxes muſt be now removed to a warm ſituation, where the cutting winds have no power, and where they may enjoy the full ſun all the winter. Remember to clear the pots or boxes from weeds.

With regard to your ſeedling flowers in beds, let them be carefully weeded, and then ſome light rich earth ſifted over the ſurface to the thickneſs of half an inch; for this will be of the utmoſt ſervice to the plants, particularly thoſe which were not tranſplanted in the ſummer.

Propagate Roſes and other flowering Shrubs by Suckers.

Roſes, lilacs, and other flowering ſhrubs of that kind are encreaſed by ſuckers from the roots; and this is a very proper ſeaſon, if the weather be mild, to tranſplant them. They will make good plants in two years time.

Prune Roſes, Honey-ſuckles, &c.

This is a very proper ſeaſon to prune roſes, honey-ſuckles, and all other ſorts of flowering ſhrubs.

Remember to prune them with a ſharp knife, and to cut off cloſe to the place from whence they proceed, all the ſtrong luxuriant ſhoots of the laſt ſummer's growth: and where any branch advances in a ſtraggling manner from the reſt, let it be ſhortened; obſerving, if poſſible, to cut it cloſe to a young ſhoot.

All ſuckers which riſe from the roots ſhould be taken away, and every ſhrub kept to a ſingle ſtem.

As ſoon as the pruning is finiſhed, let the cuttings and litter be cleared away, and the ground well dug a ſpade deep, cutting off all the ſtraggling roots, and taking up all the ſuckers.

Propagate hardy Trees and Shrubs by Layers.

Moſt of the trees or ſhrubs that ſhed their leaves in winter, may be propagated by layers, and this is a proper ſeaſon for doing it on the hardy kinds. The method is this:

Dig the ground round the tree or ſhrub, bend down the pliable branches, lay them in the earth, and ſecure them with hooked or forked ſticks. When this is done, let all the young ſhoots on each branch be laid down, and the bodies of them covered about three inches deep with earth, leaving the top of each, two, three, or four inches out of the ground.

In this manner they muſt remain till this time twelvemonth, when they will be ſufficiently rooted, and ſhould then be tranſplanted.

Tranſplant Layers.

This is the proper ſeaſon for tranſplanting the layers of ſuch trees and ſhrubs as were layed laſt year. As

ſoon as they are taken up let their roots be pruned, and afterwards planted in rows twelve inches aſunder.

Propagate flowering Shrubs by Cuttings.

Honey-ſuckles, laurels, and Portugal laurels, and many other ſorts of hardy ſhrubs and trees may be raiſed from cuttings, and this is the proper ſeaſon for planting them.

Let the cuttings be choſen from the laſt ſummer's ſhoots, about ten or twelve inches in length, and planted in rows two inches aſunder, and about eight inches apart in the rows.

The cuttings of laurel, and Portugal laurel, ſhould have about two inches of the former year's wood with them.

Plant Box Edgings.

This is the beſt time of the year for planting box-edgings; for the box will now take root freely.

If you intend your edgings ſhould be neat, procure a ſufficient quantity of ſhort buſhy box, which muſt be ſlipped or parted, and the long ſticky roots cut off.

Your box being thus prepared, ſtretch your line along the edge of the bed or border, and let that part be made up all the way pretty firm and full; then with your ſpade cut a trench about ſix or eight inches deep on the ſide of the line next the walk, making the ſide next the line perfectly upright.

In this trench let the box be ſet cloſe againſt the ſide next the line, placing the plants ſo near together, as to form a cloſe compact edging, without being too thick and clumſy; and as you proceed in planting, draw the earth up to the outſides of the plants, which will fix them in the proper poſition. When the row is planted, let the top be cut as neat and even as poſſible with a pair of ſheers.

Plant Thrift Edgings.

This is alſo a very proper time for planting thrift; and the ſame method ſhould be followed in planting thrift as in planting box. The plants, if the edging be intended to be neat, ſhould be ſet ſo cloſe as juſt to touch one another.

Mow Graſs-Walks and Lawns.

If the graſs of your walks and lawns be not well cut at this ſeaſon, they will appear very rough all the winter; let your walks and lawns, therefore, be now mown as cloſe and even as poſſible.

It will alſo be often neceſſary to poll your graſs-walks, in order to ſcatter the worm-caſts, and then to roll them with a wooden roller. For the worm-caſts being broken, and ſpread abroad by means of the poll, will readily ſtick to the rollers, and conſequently give the ſurface of the graſs a clean and neat appearance.

NOVEMBER.

Work to be done in the KITCHEN-GARDEN.

Cauliflower Plants.

REMEMBER to let the air have free acceſs to your cauliflower plants ſet in frames, every day, by taking the glaſſes entirely off the frame in the mornings, except the weather be extremely wet, when the lights muſt be raiſed a conſiderable height, but not taken away. But let the plants be covered every night.

Whenever you perceive any dead leaves upon your plants, let them be taken away; and be ſure to keep the bed perfectly free from weeds.

The ſame treatment will be neceſſary for your cauliflowers under hand or bell-glaſſes; and it will be of great ſervice to the plants, if a little earth be drawn up round their ſtems.

You may yet plant out cauliflower plants under hand or bell-glaſſes; but let it be done at the beginning of the month, and the ſooner the better.

Beans.

If you omitted to plant beans laſt month, for an early crop, let it be done at the beginning of this: but if ſome were planted at that time, and theſe are intended to ſucceed them, they ſhould not be ſet till about the latter end of the month.

The mazagan bean is the moſt proper for planting at this ſeaſon, becauſe it comes in the ſooneſt, is a great bearer, and very good for the table.

You muſt remember to plant your beans in a warm border, under a ſouth wall, or other fence, and to follow the inſtructions given in October.

Peas.

About the middle of this month, you ſhould ſow another crop of peas, if a regular ſupply for the table be deſired. But if none were ſown in October, they ſhould be ſown in the beginning of the month.

The early hot-ſpur is the moſt proper for ſowing at this ſeaſon; and it muſt be done in the manner directed laſt month, under a ſouth wall, or other fence.

Sow Carrot-Seed.

Let a little carrot-ſeed be ſown, in a warm border, at the beginning of this month; for there is reaſon to hope it will ſucceed, and produce young carrots for the table early in the ſpring, when they will be very agreeable.

Take up Carrots and Parſnips.

Your carrots, parſnips, and other kitchen-roots, ſhould be taken out of the ground in the beginning of this month, and laid in ſand for winter uſe.

For if theſe roots are ſuffered to continue in the ground, they will canker and rot: beſides, if the froſt ſhould ſet in ſeverely, the ground would be ſo hard, that it would be difficult to take up the roots when wanted.

Let, therefore, the advantage of a dry mild day be taken for digging up the roots, the tops of which muſt then be cut off cloſe, the whole roots well cleaned from earth,

earth, and then carried into ſome convenient dry place to be preſerved for uſe, in the following manner:

Lay on the floor a bed of dry ſand, about two or three inches thick; place the roots upon the ſand cloſe together, obſerving to lay the crowns of the roots outwards.

Cover the roots with ſand two inches thick, then lay more roots upon that, and then more ſand; proceeding in this manner with a layer of ſand, and another of roots, till all are depoſited, covering the upper layer of roots with ſand, and laying ſome dry ſtraw over the whole.

Potatoes.

If any of your potatoes ſtill remain in the ground, let them be taken up as ſoon as poſſible, before the ſevere froſts begin; for theſe roots are very ſoon affected by the froſt, which renders them watery, and unfit for the table.

As ſoon as your potatoes are taken up, let them be laid in a dry room, and covered with dry ſtraw a foot thick, as ſoon as the froſt begins.

It will alſo be neceſſary to look them over from time to time, taking away all ſuch as have any tendency to rottenneſs, for otherwiſe they will ſoon infect the whole heap.

Spinage.

Remember to keep your beds of ſpinage perfectly clean from weeds; and wherever you perceive the plants ſtand too thick, let the ſmalleſt be taken up for uſe, ſo that every plant may ſtand ſingly. By this means the ſun and air will have free acceſs to the ſurface of the ground, to warm and dry it, which will cauſe the plants to thrive greatly.

You ſhould alſo remember, in gathering ſpinage, to cut only the large outſide leaves; by which means the inner ones will grow larger, and be fit to gather in their turn.

Artichokes.

About the middle or latter end of the month, the leaves of your artichokes muſt be cut down cloſe to the ground, and the plants earthed up, to protect them from the ſevere froſts of the winter. There are two methods of earthing, or as the gardeners call it, landing up artichokes. The firſt method is this:

Let trenches, about twenty inches wide, be marked out between all the rows, and the ground dug out a good ſpade deep, laying the earth, as it is dug up, over the rows of the plants, and obſerving to cover the crowns of them ſix or eight inches deep at leaſt.

The ſecond method practiſed by many gardeners is as follows:

The line is to be extended exactly along the middle of the ſpaces, between the rows of the plants, and a mark cut with the ſpade under the line. With theſe lines a kind of beds, four or five feet, are formed, having a row of plants ſtanding along the middle of each bed. The ground is then to be dug regularly bed by bed, digging cloſe about and between all the plants; at the ſame time working, or rearing the earth gradually from the above lines or marks on each ſide the row of plants, into a ridge ſloping equally on each ſide with the row of plants in the middle of the ſaid ridge.

By either of theſe methods the artichokes will be protected from the froſt, unleſs it be remarkably ſevere, when it will be neceſſary to lay over every ridge a covering of ſtraw, or other long litter, which, with the earth thrown up, will be a ſure protection to the plants.

Some gardeners, indeed, content themſelves with covering the plants with long dung; but the plants are not ſo effectually protected by this method, as by either of the former.

You ſhould remember, in dreſſing artichokes, that if any of the ſtrong plants ſhould now ſhew fruit, and you are deſirous of ſaving it, not to cut the leaves, but to tie them up cloſe with a hay-band, and then to lay the earth over the roots as above directed, cloſing it well about the outſides of the leaves. By this method the plant will be preſerved in a growing ſtate, and conſequently bring the fruit to perfection.

Aſparagus.

If your aſparagus beds were not dreſſed laſt month, it muſt be done now, and the ſooner in the month the better.

In order to which, let the ſtems or haulms of the aſparagus be cut cloſe to the ſurface of the beds, and carried away directly.

When this is done, let every weed on the beds be cut up with a ſharp hoe, and drawn off into the alleys.

The beds being thus cleaned, ſtretch your line along the ſide of each bed, and with your ſpade mark out the alleys about eighteen or twenty inches wide; and let the alleys be dug out one ſpade deep, and the earth laid neatly over the beds. Remember, as you go on, to bury the weeds drawn off the beds a proper depth in the alleys, and to make the edge of every bed ſtraight and full.

Sow Radiſhes.

If a little radiſh ſeed be ſown at the beginning of the month, in a warm border near a wall, or other fence, there will be great hopes of ſucceſs, provided the weather be not too ſevere. Thoſe that ſurvive the froſt will come early in the ſpring, and are therefore valuable. Remember to ſow the ſeed pretty thick, to do it in a dry day, and to rake it in lightly with an even hand.

Sow ſmall Sallad Herbs

If a conſtant ſupply of ſmall ſallad herbs, ſuch as muſtard, creſſes, radiſh, rape, and lettuce, be required for the table, they ſhould be ſown every ten or twelve days.

But the bed ſhould now be made in a warm ſituation, where the earth is rich and light. The bed ſhould be properly adapted to the length of a three-light frame, obſerving to raiſe it a foot or more higher in the back than in the fore part, and to make the ſurface very ſmooth.

When this is done, put on the frame, ſinking the back part of it in the ground, ſo that the ſurface of the bed may be every where within ſix or eight inches of the glaſſes.

The ſeeds muſt be ſown in ſhallow drills, and juſt covered, not more than a quarter of an inch at moſt, with earth.

This being done, put on the glaſſes, and as ſoon as the plants appear, let them have air, by raiſing the lights, or taking them entirely away, as you ſee neceſſary; remembering to cover them cloſe every night.

By this method you may raiſe ſmall ſalleting, during the whole winter, without the aſſiſtance of artificial heat, except when the froſt is very ſevere.

Lettuce.

Remember to give your lettuce plants in frames freſh air every day, when the weather is mild and dry, by taking the glaſſes entirely off in the morning: but if the weather be very cold, or likely to be wet, let them be put on again in the evening, otherwiſe the plants may remain uncovered during the night; for the cloſer theſe plants are kept, the weaker they will be when drawn up.

The glaſſes muſt, however, be kept on when the weather is wet; but even then they muſt be raiſed a conſiderable height at the back of the frame; for the plants muſt have a quantity of freſh air.

But in ſevere froſty weather the glaſſes muſt be kept cloſe, and, if neceſſary, other coverings muſt alſo be uſed.

The ſame inſtructions muſt be obſerved with regard to thoſe lettuce plants under hand or bell-glaſſes.

Celery.

Remember to keep your celery now blanching well earthed up, for this will preſerve it from the froſt. The earth, after being well broken, ſhould be laid up to the plants within ſix inches of the tops of their leaves.

But be ſure to take care not to lay the earth to the plants too haſtily; becauſe the earth would by that means be forced into their hearts, and cauſe them to rot.

Endive.

Let more of your endive plants be now tied up to whiten; but be ſure to chuſe a dry day for this purpoſe.

When the leaves of the full grown plants are perfectly dry, let them be gathered up regularly in the hand, and tied together with a ſtring of baſs.

But if the weather be inclinable to be froſty, or even wet, the following method may be practiſed.

Draw up ſome of the beſt and largeſt plants, in a dry mild day, and hang them up by their roots acroſs ſome lines ſtretched in a dry place, for a day or two, in order to drain off the wet from between the leaves.

When the plants are thus dried, let ſome barrows full of dry and light earth be laid in a frame, obſerving to raiſe the earth to the top of the back part of the frame, and let it come ſloping to the front.

As ſoon as this is done, gather up the leaves of the endive evenly in your hand, and let the plants be buried in the above earth, almoſt to the tops of their leaves; and when the weather is very wet or froſty, let the glaſſes be cloſe ſhut, and other coverings uſed when thought neceſſary.

If you have not a frame at liberty, earth may be laid in any dry open ſhed; remembering to raiſe the earth in a high ridge. In this earth, let the plants be placed as above directed, obſerving to cover the plants with long litter, when the froſt is ſevere.

By either of the above methods, endive may be blanched in any of the winter months, and, conſequently, a proper ſupply be procured for the table, provided care be taken to have a ſufficient quantity of plants againſt the dreary ſeaſon.

If you have neither the convenience of ſhed or frame, you may practiſe the following method.

Dig a ſmall ſpot of ground in a border, under a ſouth-wall, or other fence, remembering, as you dig it, to throw up the earth in a high ſharp ridge lengthways the border, making the ſouth ſide as ſteep as poſſible; and let the endive plants be prepared as above directed.

When the bed is thus prepared, gather up the leaves of every plant cloſe and regular, and put them into the earth on the ſouth-ſide of the ridge almoſt to the tops of their leaves. But remember that the plants are not to be ſet in an upright manner, but placed as it were on their ſides, in a ſloping manner, like the ſurface of the bed: one or two rows may be put in length-ways the ridge.

The plants, by this contrivance, will blanch freely; nor will there be any danger of their rotting, for too much wet cannot lodge on the ſurface of the bed.

But you muſt remember to cover the plants in ſevere froſts, with peas-haulm, fern, or ſome other dry long litter.

The endive plants in the bed muſt alſo be covered in hard froſt; for theſe plants cannot endure ſevere cold.

Cardoons.

As your cardoons advance in height, let them be earthed up: but remember to gather their leaves up very cloſe and even, and to tie them together with a hay-band; and to break the earth well before it be laid up to the plants.

A dry mild day ſhould alſo be choſen for this work; for if the leaves of the plants are not perfectly dry when the operation is performed, they will rot.

Onions.

Remember to pick out all the weeds carefully from the beds of your ſpring onions; for they will otherwiſe ſoon overtop and deſtroy the plants.

Manure and Trench your Garden Ground.

Let the rotten dung from your old hot-beds be now laid on the ſurface of ſuch parts of your kitchen-garden as want manure.

At the ſame time, let all ſuch pieces of ground as are now vacant, be dug, trenched, and ridged up; that every advantage may be reaped from the influence of the ſun, rains, and froſt.

Let the ridges be dug about two or three ſpades broad, laid up rough, and as high and ſharp as they will ſtand. Theſe ridges will be eaſily levelled down in the ſpring, when the ground is wanted for the reception of ſeeds or plants.

The NURSERY.

Management of Seedling Plants.

You muſt remember to ſhelter your ſeedling exotic plants in beds, from the ſharp froſty weather. This may be done by laying fern, peas-haulm, or other

light ſubſtance, about the ſtems, and over the tops of the plants; obſerving to take it away when the froſt breaks.

Or by placing ſome hoops acroſs the bed, and throwing thick mats over the hoops, when the froſt is very ſevere.

With regard to your plants in pots, it will be proper to plunge the pots to their brims in a dry, warm ſpot of ground; and, if the froſt be very ſevere, to place hoops over the pots, and cover them with mats.

Management of new-planted Trees and Shrubs.

The greateſt care ſhould be taken to protect the roots of new-planted trees and ſhrubs from froſt; particularly thoſe of the more tender kinds.

In order to this, let mulch or long litter be laid a conſiderable thickneſs over the ſurface of the earth between the plants, for this will prevent the froſt from penetrating to their roots.

At the ſame time, let all your new-planted trees which are tall, be ſtaked, and the ſtems tied faſt to theſe ſtakes, that violent winds may not blow them to one ſide.

Finiſh Tranſplanting.

All the trees and ſhrubs you intend to tranſplant this year, muſt be removed before the middle of the month. Indeed it will not be prudent to defer it ſo long; for if the hard froſts ſhould ſet in before the trees have taken root, they will in all probability miſcarry.

Dig and Trench Ground for new Plantations.

Where new plantations are to be made in February or March, the ground ſhould now be well dug and trenched; by which means it will be in fine order to receive the plants in the ſpring.

Manure the Ground.

Let dung be laid on the ſurface of ſuch parts of the nurſery that want manuring; but remember to chuſe dry or froſty weather for this work.

It will alſo be of great benefit to your young trees, if a little dung be now ſpread over the ſurface of the ground where they ſtand; for the rains will waſh the ſalts of the dung, in which its virtues conſiſt, into the ground among the roots.

The Fruit-Garden.

Prune Peach, Apricot, and Nectarine Trees.

Any time this month is a proper ſeaſon for pruning peach, apricot, and nectarine trees; obſerving the ſame method as mentioned in the preceding month.

The laſt ſummer's ſhoots are to be preſerved in every part, at proper diſtances; for on theſe ſhoots principally all the above trees produce their fruit.

At the ſame time, let the old naked branches, which have no ſhoots upon them, be either entirely cut off, or ſhortened to ſome convenient branch that ſupports ſuch ſhoots; always remembering to cut them off cloſe, and to make the cut very ſmooth.

In a word, let ſome of the old wood, in every part of the tree, be cut away every year in the winter pruning, in order to make room for the laſt ſummer's ſhoots, a ſufficient ſupply of which ſhould be left in every part, at convenient diſtances, for bearing fruit next ſummer; cutting away all that are not wanted for that purpoſe.

At the ſame time, the young ſhoots that are left muſt be ſhortened, more or leſs, in proportion to the vigour of the tree, and the ſtrength of the different ſhoots. For by this means the ſhoots will produce a ſufficient ſupply of new ſhoots next year, for bearing fruit the year enſuing.

It may not be amiſs to repeat the cautions given laſt month with regard to theſe trees, namely, as ſoon as you have pruned one tree, to nail up the branches before you begin another; and to nail the branches and ſhoots ſtraight, and cloſe to the wall, at about ſix inches diſtant from one another.

Prune Apple, Plum, and Pear-Trees planted againſt Walls or Eſpaliers.

The above trees may be pruned any time this month; but remember to examine them attentively, and to cut out of every part of the tree all the old and uſeleſs wood.

At the ſame time, wherever a ſupply of young bearing wood is wanting, let a ſufficient number of the beſt ſituated ſhoots of the laſt ſummer's growth be left. But theſe ſhoots muſt not be ſhortened: each muſt be laid in at its full length; for each of theſe ſhoots will, the ſecond or third year, begin to produce thick, ſhort ſhoots or ſpurs, about an inch long; and upon theſe ſhoots, or natural ſpurs, only, the fruit of theſe trees is produced. Conſequently, if the ſhoots laid in for bearing were to be topped, or ſhortened, they would produce no ſuch ſhoots or ſpurs, and therefore no fruit: but inſtead of theſe ſpurs, or bloſſom-buds, they would ſend out ſtrong, and entirely uſeleſs, ſhoots; by which means the tree would be crowded with needleſs wood, and, at the ſame time, not produce one tenth part of the fruit it would have done, had the branches been laid in at full length.

Hence it plainly appears, that neither the old nor young branches of any of theſe trees are to be ſhortened at this or any future pruning, either in ſummer or winter.

At the ſame time, all the branches ſhould be carefully examined; and where there are any old naked branches, or ſuch as ſupport very little bearing wood, let them be taken away, to make room for training more promiſing branches, and form, in a regular manner, a conſtant ſupply of young wood.

As ſoon as all the old and uſeleſs wood is cut away, let all the remaining uſeful branches be well examined; and wherever you perceive theſe ſtand too cloſe, let ſome of them alſo be taken away, remembering to clear out thoſe which grow in the moſt irregular manner, and ſuch as can beſt be ſpared; but be ſure not to let any two branches grow acroſs one another, nor any remain at leſs than ſix inches from the next.

Remember alſo, when you take away any branch, to cut it off quite cloſe; for no ſpurs, but thoſe naturally produced, muſt be left.

Let all the branches, as ſoon as the pruning is finiſhed, be laid in horizontally, trained ſtraight and cloſe, at regular diſtances, and immediately nailed to the wall, or tied to the eſpalier.

Prune Cherry Trees.

Your cherry-trees, whether ſtandards, or dwarfs planted againſt walls, ſhould now be pruned.

With regard to the wall cherries, the ſame method before laid down for pruning plumbs, &c. muſt be obſerved. All ſuch old branches as ſupport but little or no bearing wood, muſt be taken away, in order to make room to train the full-bearing branches, together with the laſt ſummer's ſupply of young wood, in a regular manner.

At the ſame time, wherever a ſupply of new wood is wanting, remember to leave, in proper places, a ſufficient number of the laſt year's ſhoots; but all thoſe which are not wanted for the above purpoſes, muſt be now cut off cloſe.

You muſt alſo remember not to ſhorten any of theſe ſhoots or branches: they muſt be lain in at full length; for cherry-trees, like thoſe of the apple, pear, and plum, produce their fruit principally upon ſpurs; and the branches, if not ſhortened, will begin to produce theſe ſpurs in the ſecond year.

Be particularly careful in pruning morella cherry-trees, always to leave a ſufficient ſupply in every part of the tree of the laſt ſummer's ſhoots, about five or ſix inches apart; for this ſpecies of cherry-tree produces the greater part of its fruit upon the laſt year's ſhoots.

Prune Vines.

Any time this month will be a proper ſeaſon for pruning your vines, whether planted in vineyards or againſt walls.

In pruning vines, remember to cut out all the old uſeleſs wood, in order to make room for the bearing ſhoots or branches; and to leave, in every part, a proper ſupply of the laſt ſummer's ſhoots to bear fruit the next ſeaſon.

For theſe ſhoots will, in the ſpring, produce from every eye, or bud, a young ſhoot; and on theſe young ſhoots the grapes are produced the ſame ſummer, the bearing ſhoots of vines being in general produced from branches one year old.

It is therefore neceſſary to leave, at this pruning, a ſufficient ſupply of the laſt ſummer's ſhoots in every part of the vine.

But in doing this, let the ſtrongeſt and beſt ſituated ſhoots, and ſuch as have the ſtrongeſt joints, be choſen; and let each be ſhortened in proportion to its ſtrength: that is, the ſtrongeſt ſhould be cut off at the fourth or fifth eye, and thoſe that are weaker about the third.

For if the ſhoots are left longer, they will fill the vine, during the enſuing ſummer, with more ſhoots than you can find room to lay in. At the ſame time, the fruit on ſuch ſhoots will be ſmall, ill grown, and ill ripened. But if the ſhoots be ſhortened to the lengths abovementioned, they will each, next ſummer, produce three or four good ſhoots, and every one of theſe plants two or three bunches of fruit, which will grow very large, and ripen kindly.

You muſt remember, in ſhortening the ſhoots, to cut them off about an inch above an eye, and to make the cut ſloping; at the ſame time not to leave any branches nearer to each other than ten or twelve inches.

Let care be taken to prune your vines in ſuch a manner, that there may always be a ſucceſſion of young branches near the bottom; becauſe theſe will ſupply the place of old naked wood, which muſt every year be cut out as it becomes uſeleſs.

Nor ſhould you ever ſuffer any of the old naked branches to remain, unleſs there be no younger branches or ſhoots properly ſituated to ſupply their place.

As ſoon as the pruning is finiſhed, let the branches be laid in ſtraight and regularly, about ten or twelve inches from one another, and nailed up neatly.

Prune Gooſeberry and Currant-Trees.

This is a proper ſeaſon for pruning gooſeberry and currant-trees; a work which gardeners too often neglect, though the fineneſs of the fruit greatly depends upon it.

Let all the old wood be cut out as it becomes uſeleſs, and young branches left to ſupply its place; at the ſame time the branches ſhould be kept free and clear from one another.

Nor muſt you ſuffer any ſuckers from the roots to ſtand for bearing branches; theſe muſt be entirely cleared away every year.

Prune Raſpberries.

It is not yet too late to prune raſpberries, which muſt be done in the manner directed laſt month. After which, the cuttings are to be cleared away, and the ground dug between the plants.

Prune Standard Fruit-Trees.

This is the proper ſeaſon for examining your ſtandard apple or pear trees, either in the orchard or garden; and wherever you perceive any dead, or very old branches, let them be cut away, together with any large branches that grow in a rambling manner acroſs the reſt.

At the ſame time, where you obſerve the branches to ſtand too cloſe, ſo as to interfere with one another, let the moſt irregular growers be taken away.

By dreſſing your orchard in this manner, you will have handſome and laſting trees, which will produce large and well-taſted fruit.

As ſoon as you have finiſhed pruning, let all the moſs, if any be found on the ſtems or branches, be cleared away.

Tranſplant Peach, Nectarine, and Apricot Trees.

You may ſtill tranſplant peach, nectarine, and apricot trees, provided it be done when the weather is open.

If you intend to make an entire new plantation of theſe trees, let the method laid down in the Introduction to this Kalendar be followed.

But if only a few trees are wanted in different places, it will be ſufficient to trench the border in the parts the trees are to ſtand, adding a little dung, and a proper quantity of good loam, where it can be procured; if not, freſh earth muſt ſupply its place.

Remember to let the trees ſtand fifteen or ſixteen feet from one another, and the ſtem of each tree to ſtand four inches at leaſt from the wall.

Tranſplant Apple, Pear, Plum, and Cherry-Trees.

Any time this month, when the weather is open, will be a proper ſeaſon to tranſplant apple, pear, plum, and cherry-trees, where they are wanting.

Remember

Remember, if theſe trees are to be planted againſt walls, to allow them ſufficient room, a caution that has been too frequently forgot in plantations; for how often do we ſee them blended together, before the trees are half grown to their proper ſize; by which means the bearing wood is obliged to be cut away, and the trees are ſtarved for want of nouriſhment; for their roots, as well as their branches, will interfere with one another.

Let your trees therefore be ſet fifteen feet from one another, at leaſt; if ſixteen the better. Apples and pears will require eighteen or twenty.

At the ſame time let the border be trenched up two ſpades deep, and ſome very rotten dung laid in: unleſs the earth of the border be naturally bad, when a quantity of freſh loam, ſhould if poſſible be procured, and worked up well with a little rotten dung, and ſome of the earth of the border. In this compoſt the trees will thrive well: for freſh loam is of the utmoſt conſequence.

Tranſplant Standard Fruit-trees.

This is alſo a proper ſeaſon for tranſplanting ſtandard fruit-trees. It may be done any time in the month, provided the weather be mild and open.

Remember not to ſet theſe trees nearer to one another than thirty feet, whether they be planted in the garden or orchard. The method neceſſary to be followed in making theſe plantations has been already laid down in the Introduction to this Kalendar.

Tranſplant Mulberry, Medlar, and Quince-trees.

Mulberry, medlar, and quince-trees, may now be ſafely tranſplanted, for they will ſucceed. The very ſame method is to be followed in planting theſe, as in planting other fruit-trees.

Plant Raſpberries

You may ſtill make new plantations of raſpberries; but the ſooner it is done the better.

The plants muſt be ſet in an open ſpot, in rows four feet aſunder, allowing three feet between plant and plant in the rows.

Plant Filbert-trees, &c.

This is a proper ſeaſon for planting filbert and hazle nut-trees, where they are wanted.

They will both thrive in almoſt any ſituation, provided the ground be not too wet in winter; they are generally raiſed by ſuckers from the roots.

Theſe ſhould be planted in rows ten or twelve feet aſunder, and the plants ſix feet apart in the rows.

General Directions for Planting.

The following inſtructions ſhould be conſtantly obſerved in planting all kinds of fruit-trees.

1. Let a hole be opened for each tree, wide enough to let the roots ſpread freely and equally every way; and let the ground at the bottom of the hole be well looſened with a ſpade.

2. Let the roots of the trees be pruned; that is, all the broken and bruiſed parts be cut off, the ſtragglers ſhortened, and the ends in general trimmed. For this will make them produce new fibres more freely.

3. Let no tree be ever planted too deep; that is, never let the upper part of the root be more than three inches below the common ſurface of the ground.

4. Let the tree be placed perfectly upright in the hole, and let the earth be well broken, and thrown in equally about all the roots, the tree being at the ſame time ſhook gently, that the earth may fall in equally between all the ſmall roots and fibres.

5. Let the ſurface of the ground, when the hole is filled up, be trodden gently round the tree.

The PLEASURE or FLOWER-GARDEN.

Plant Tulips, Ranunculuſes, and Anemones.

You may ſtill plant the roots of tulips, ranunculuſes and anemones, provided it be done in mild open weather and before the middle of the month.

With regard to the tulips planted in beds, let them be ſet in rows nine inches aſunder, the ſame diſtance being allowed between the roots in each row.

The beds ſhould be of rich light earth, ſituated in a dry part of the garden, for too much wet would rot the roots.

The ranunculuſes and anemones ſhould alſo be planted in beds of light earth, laid up rounding, that the water in haſty rains may not continue long enough on the bed to rot the roots.

The beds where theſe roots are planted ſhould indeed be covered, as they ſhould be protected in winter from ſevere cold, and in the ſpring, when they are in bloom, from the rains and ſun. The ſame diſtance in planting theſe roots, muſt be obſerved as mentioned laſt month.

But if they are planted in borders, it will be proper to plant them in ſmall clumps or patches, each containing four or five roots, and to allow an interval of nine or ten feet between the patches.

The roots muſt not be planted more than two or three inches deep; the tulips ſhould be four or five.

Plant Crocuſes.

Crocuſes, and other ſmall bulbous roots, may alſo now be planted. But let them be planted in patches, as mentioned laſt month.

Remember not to put the roots above two or three inches under the ſurface of the ground.

Plant Narciſſuſes, Jonquils, &c.

This is alſo a proper ſeaſon for planting narciſſuſes, jonquils, and, indeed, all other bulbous roots that are ſtill above the ground. But remember to do it in mild open weather, and to follow the directions given for that purpoſe laſt month.

Set Perennial Plants.

You may ſtill plant double ſcarlet lychnis, double roſe campion, double rocket, catch-fly, campanulas, batchelors-buttons, ſweet-williams, wall-flowers, ſtock july-flowers, columbines, Canterbury-bells, tree prim-roſe, Greek valerian, perennial ſun-flower, golden rod, perennial aſters, holly-hocks, French honey-ſuckles, monkſhood, pionies, London-pride, gentianella, double daiſies, polyanthuſes, primroſes, and many other ſorts.

But

But remember, in planting the different ſorts, to let all the large or tall growing plants be placed backwards in the border or clump, and to ſet them at a good diſtance from one another.

Remember alſo to intermix the different ſorts in ſuch a manner that every part may have both an agreeable variety and a continual ſucceſſion of flowers.

Plant Box.

It is not yet too late to plant box edgings to beds or borders, where wanting. At the ſame time all gaps or uneven places may be repaired.

Tranſplant hardy flowering Shrubs.

You may ſtill, when the weather is mild and open, tranſplant roſes, honey-ſuckles, ſyringas, lilacs, laburnums, bladder and ſcorpion ſena, althæa frutex, double flowering cherry, jaſmines, gelder roſe, and many other hardy ſhrubs, for they will yet ſucceed.

Remember to take away the ſuccers, and to plant them in an open ſpot, where they will make pretty plants in two years time, and may then be removed into the clumps or borders.

Tranſplant Foreſt Trees.

Foreſt trees of all kinds may yet be tranſplanted, when the weather is mild and open. Remember to ſtake them properly, in order to ſecure them from the power of the wind, as ſoon as they are planted.

Prune flowering Shrubs.

Let all the long rambling ſhoots of the laſt ſummer's growth be cut away from your flowering ſhrubs, together with all the dead wood; and the irregular branches ſhortened.

Where the branches of any ſhrub ſtand too cloſe, let ſome of the worſt of them be taken away, and the reſt left at regular diſtances.

At the ſame time remember not to let the branches of any two ſhrubs interfere with one another: for every plant appears more agreeable to the eye when it is kept ſingle, than when intermixed with another.

As ſoon as the pruning is finiſhed let the ground between and round about the plants be dug one ſpade deep, and all the ſuccers ſent up from the roots of the ſhrubs, taken away.

Management of new Planted Trees.

You muſt be very careful, when the froſt ſets in, to protect the roots of your new planted trees, particularly thoſe of the more choice and tender kind, by covering the ſurface of the ground with mulch.

At the ſame time let ſtakes be firmly fixed in the ground near the taller trees and ſhrubs, and their ſtems faſtened ſecurely to the ſtakes. This ſhould indeed be done when the trees are planted; but if not, let it be done now, and the ſooner the better; for as long as the wind has power to rock them at their roots, they can put out no new fibres; or if any are ſhot out during a calm of two or three days, they will be broken, or at leaſt diſturbed, by the firſt high wind. You therefore cannot be too careful in this particular. Let the ſtake be ſtrong enough to ſupport the plant, and let the ſtem of it be tied to the ſtake in a neat and ſecure manner.

Management of Auriculas, and Carnation Layers in Pots.

Remember to defend your auricula plants and carnation layers planted in ſmall pots, from the froſt and heavy rains.

In order to this, let the pots be plunged up to their rims and cloſe together in a bed covered with a garden frame; and when the weather is unfavourable, let the glaſſes be put on to defend the plants.

If you have not the convenience of a frame, let the pots be plunged in a bed of dry earth, having hoops placed acroſs it; and when the weather is either very cold or wet, let the hoops be covered with mats or canvas.

But remember to take off the coverings, whether glaſſes, mats, &c. in dry open weather, when they ſhould not be covered even at nights.

Management of Seedling Flowers.

If your pots or boxes of ſeedling flowers were not removed into a warm ſituation laſt month, let them be removed at the beginning of this.

The moſt certain method to ſecure the plants from hard froſts, is to plunge the pots and boxes into the earth of a dry warm border; and when the weather proves very ſevere, to cover them with mats or long litter.

Management of Hyacinths, Tulips, &c.

Be very careful to ſhelter the beds where your choiceſt hyacinths, tulips, renunculuſes and anemone roots are planted, in heavy rains, ſharp froſts or ſnow, by drawing the mats or canvas over the hoops placed acroſs the beds. For if either too much rain or ſnow be ſuffered to remain upon the beds, the wet will penetrate to the roots, by which means many of them muſt be deſtroyed, and all of them conſiderably injured.

Management of Graſs Walks and Lawns.

As the worms at this ſeaſon throw their caſts up very faſt and thick, the graſs will become dirty, unleſs you take care to pole and role it often.

Let therefore the long pliable pole be frequently uſed, in order to break and ſcatter the wormcaſts; and the graſs afterwards well rolled with a wooden roller. By this method the graſs walks will be firm, ſmooth, and entirely clean; for all the worm caſts will ſtick to the roller.

Remember to chooſe the drieſt days for this work, and let it be conſtantly done once a week during the winter ſeaſon.

This is alſo the ſeaſon for clearing your walks from the leaves of trees, which being all fallen, ſhould be cleared away from every part of the garden.

Management of Gravel Walks.

Many throw up their gravel-walks in ridges at this ſeaſon, in order, as they pretend, to kill the weeds: but experience has ſufficiently ſhewn that it will not anſwer the intention. It is therefore a much better method to let them continue as they are: for the ridging renders them entirely uſeleſs, and gives a very diſagreeable appearance to the whole garden.

Let them therefore remain in their preſent ſituation, keeping them entirely free from weeds and moſs, which will

will now ſpread apace, and rolling them once a week, when the weather is dry.

Prepare Compoſt for Flowers.

Your heaps of compoſt ſhould be now turned, if omitted laſt month, remembering to break the clods very well, and to mix all the parts thoroughly together.

Clear the Borders.

Let all your dead annual plants, ſuch as French and African marigolds, laveteras, China aſters, and other plants of that kind, be pulled up by the roots; and all the ſtems or decayed flower ſtalks of perennial plants, be cut down; and the borders cleared from the leaves of trees and all other litter.

When this is done, let the ſurface of the borders be gone over with a Dutch hoe in a dry day, and the ſurface raked ſmooth.

This being done, look round your borders, and wherever you perceive any perennial plants wanting, thruſt a ſtick into the earth as a mark where it ſhould be planted.

DECEMBER.

Work to be done in the KITCHEN-GARDEN.

Plant Aſparagus.

IF early aſparagus be deſired, a hot-bed ſhould now be made for raiſing them.

In order to this, let the dung intended for the bed, be thrown up in a heap ten or twelve days before you uſe it; for in that ſpace of time it will be in proper order.

Remember to make the bed two inches wider on every ſide than the frame; and three feet and a half high.

When the bed has been made two or three days, level the top, and cover it equally ſix or ſeven inches thick with earth, making the ſurface perfectly even; but do not yet put on the frame.

This being done, the aſparagus plants are to be immediately placed on the ſurface, cloſe to each other, in the following manner.

Let a ſmall ridge of earth, about four inches high, be raiſed upon the ſurface, at one end of the bed. This being done, place a row of roots cloſe together againſt the above ridge, and then another row of roots againſt the former; proceeding in this manner till the whole bed is filled with roots, except two or three inches on each ſide of the bed, which muſt be left to ſupport ſome moiſt earth, which it is neceſſary to bank up againſt the outſide roots, on each ſide of the bed.

This being done, let good light earth be thrown equally over the bed, till the crowns of the roots are covered above two inches thick; and two or three pots of water poured on the ſurface to waſh the earth in among the roots; adding, after the watering, a little more earth, that the crowns of the roots may continue covered two inches thick.

In this manner the bed is to remain till the aſparagus begins to appear through the covering of earth; when another parcel of earth, to the depth of three or four inches, is to be laid upon the bed; ſo that the crowns of the roots may now be covered five or ſix inches deep.

The bed being thus prepared, thick bands or ropes of ſtraw muſt be fixed round the bed for the frame to reſt upon. This is done in the following manner:

Let ſome bands of ſtraw, about three or four inches thick, be made, and faſtened down round the upper part of the bed, with ſtakes about two feet long, ſharpened at one end in ſuch a manner, that the upper part of the ſtraw may be exactly level with the ſurface of the earth; remembering to thruſt the ſtakes down into the dung of the bed. This being done, let the frame and glaſſes be immediately placed on the band of ſtraw.

If any heavy rains or great ſnows ſhould happen to fall during the time the bed continues without a frame, it muſt be defended with a good thick covering of ſtraw or mats.

By this method the buds will riſe very thick in about a month or five weeks time, and grow ſurpriſingly faſt.

When you perceive the heat begins to decline, which will happen in about eighteen or twenty days after the bed is made, it muſt be renewed by applying a lining of freſh dung to the ſides. Nor ſhould you forget, when the buds begin to appear, to cover the glaſſes every night with mats or long litter.

Remember to place the crowns of the roots upright when you ſet the plants in the bed, and to gather the roots of each plant cloſe together, ſo that a bed adapted to a three-light frame, may contain at leaſt three or four hundred roots.

The plants for this purpoſe ſhould not be leſs than three, nor more than five years old.

Set Beans.

If you did not plant any beans laſt month, a few ſhould be planted at the beginning of this; but if they are to ſucceed the former plantation, the middle of the month will be ſoon enough.

In order to this, let a piece of ground be prepared in a ſheltered ſituation, and mazagan beans, for theſe will come the earlieſt, planted in rows two feet and a half aſunder, and the beans four inches apart. They ſhould be planted about two inches deep in the ground.

About the laſt week in this month a few Sandwich beans may be planted; they will come at a right time to ſucceed the crop of ſmall early beans, planted at the beginning, or in the middle of the month.

They ſhould be planted about three inches deep, in rows three feet aſunder, and the beans five or ſix inches apart in the rows.

At the ſame time, care ſhould be taken to guard thoſe beans which are up from the froſt, by drawing the earth up to their ſtems as they advance in height; but remember to

do

do it in a mild dry day, and when the ſurface of the earth alſo is tolerably dry.

Sow Peas.

Let a ſpot of ground be got ready, when the weather is open, for ſowing another crop of peas, to ſucceed that ſown in the foregoing month.

The ground being prepared, draw ſmall drills about three feet aſunder, and ſcatter the peas, which ſhould be the earlieſt hotſpur, pretty thick in the drills, covering them with earth about an inch and a half deep.

Theſe peas may be ſown any time this month, when the weather is open; but if they are to ſucceed thoſe ſown in November, the middle of the month will be the moſt proper ſeaſon.

Remember, if you have any peas above the ground, to draw ſome earth up to their ſtems, to protect them from wet and froſt; but this muſt be done in a dry mild day, and the earth broken very fine before it is drawn up to the plants.

Sow Carrots.

If young carrots be deſired early in the ſpring, a little ſeed may be ſown any time this month, when the weather is mild and dry. And if the ſeaſon proves any thing favourable after Chriſtmas, a few young carrots may be expected pretty early.

In order to this, let a ſpot of ground, in a warm border, be prepared, the ſeed ſown pretty thick on the ſurface, and immediately raked in equally with an even hand.

Sow Lettuce Seed.

Any time this month, when the weather is mild, a little lettuce ſeed may be ſown on a warm ſouth border; and, if the ſeaſon ſhould prove favourable, it will ſucceed tolerably well, and produce plants, which will be very uſeful in the ſpring.

Sow ſmall Sallading.

The ſeeds of muſtard, creſſes, radiſh, rape, and lettuce, ſhould be ſown once in ten or fourteen days, if a proper ſupply be wanted.

Theſe ſeeds muſt be ſown in a bed of light earth, covered with a frame; the ſeeds alſo muſt be covered near a quarter of an inch with earth.

The glaſſes muſt likewiſe, in general, be kept on the frames; but the plants muſt have freſh air every day, when the weather is mild, by raiſing the glaſſes on props. When the weather is very fine, which ſometimes happens this month, the glaſſes may be entirely taken away; but be ſure to keep the bed covered cloſe with the glaſſes every night.

Sow Radiſh Seed.

A little radiſh ſeed may be ſown any time this month, when the weather is dry and open. The plants, if they ſucceed, will come early in the ſpring.

In order to this, let a ſmall ſpot of ground, warmly ſituated under a ſouth wall, be prepared, the ſeed ſown on the ſurface, and raked in with an even hand. The beſt ſort for ſowing, at this ſeaſon, is the ſhort-topped radiſh.

If the froſt ſhould be ſevere, you muſt cover the bed with peas-haulm, fern, or other long litter.

Management of Cauliflower Plants.

The cauliflower plants under frames muſt now be looked over, and all the decayed leaves, which are very injurious to the plants picked off, whenever they appear.

Be ſure to take off the lights every mild day, that the plants may enjoy the benefit of the free air; but remember to put the glaſſes on every night.

When the weather is very wet, the glaſſes muſt not be removed, but propped up a conſiderable height at the back of the frame; for theſe plants require a large quantity of freſh air.

In ſevere froſty weather, however, it will be neceſſary not only to keep the plants conſtantly covered with the glaſſes, but alſo to lay a covering of ſtraw, fern, or long litter, over the glaſſes, and round the outſides of the frame.

With regard to the cauliflower plants under hand or bell-glaſſes, the ſame management will be neceſſary for them as for thoſe under frames.

Management of Lettuce Plants.

You muſt remember, every mild and dry day, to uncover your lettuce plants under frames; for a free circulation of freſh air is neceſſary to their growth: nor ſhould you put on the glaſſes at night in very mild weather.

When the weather is very wet, the glaſſes muſt not be removed, but raiſed up a conſiderable height at the back of the frame, by which means a quantity of freſh air will be admitted to the plants.

In froſty weather, the plants muſt be clovered cloſe with the glaſſes; and if the froſt be very ſevere, it will be neceſſary to add a covering of mats, ſtraw, fern, or long litter.

Remember to take away all decayed leaves whenever any appear upon the plants, and to keep them entirely free from weeds.

Earth up Celery.

The firſt mild dry day, when the plants are perfectly dry, let your celery be earthed up; but remember to break the earth very ſmall, and to lay it up carefully againſt the plants, ſo as neither to break their leaves, nor bury their hearts.

The plants ſhould, if poſſible, be earthed up within four or five inches of their tops: for this will at once defend them from the froſt, and blanch them a conſiderable length.

It will be proper, when the weather is very ſevere, to cover with peas-haulm, fern, or the like, ſome of your beſt celery plants; for by this means the plants will be protected from the froſt, and the ground from being frozen, ſo that you may take up the plants whenever any of them are wanted for the table.

Earth up Cardoons.

Your cardoons ſhould, when the weather is mild and dry, be earthed up, in order to blanch them, and, at the ſame time, to defend them from the froſt.

In order to this, let the leaves be gathered up regularly, and tied together with hay-bands. When this is done

done, let the earth be well broken, and laid up round each plant, as near the top as poſſible. In very ſevere weather, ſome dry litter ſhould be laid up round your beſt plants, in order to preſerve them from the froſt.

Earth up Artichokes.

If your artichokes were not earthed up laſt month, let it be done, if poſſible, at the beginning of this; at leaſt ſome dry litter laid over them.

The leaves ſhould all be cut down and cleared away; and then the earth laid over the rows of plants, in the manner mentioned laſt month.

But if the ground be frozen ſo hard, that you can not dig between the plants, or time will not permit your doing it, be ſure to lay ſome dry long litter over and round the plants, to protect them from the effects of the froſt.

Blanch Endive.

More of your large endive plants may now be tied up, in order to be blanched, provided the weather be mild and dry.

In order to which, the leaves ſhould be gathered up evenly in the hand, and tied together a little above the middle of the plant: but remember to let the plants be quite dry before you tie them up, for otherwiſe they will rot.

In very wet or froſty weather, endive cannot be blanched by this method. Some of the fineſt plants muſt therefore be drawn out of the ground the firſt dry mild day, and hung up two or three days by their roots in ſome ſhed, that the moiſture may drain away from between their leaves. When this is done, they are to be blanched in the manner directed laſt month.

Muſhrooms.

The greateſt care muſt now be taken to keep the froſt and wet from your muſhroom-beds. The beſt method of doing this is by covering them a foot thick, at leaſt, with clean ſtraw.

Remember always to examine the covering after heavy rains or ſnows, and wherever you find it wet to the bottom next the bed, let the wet ſtraw be taken away as ſoon as poſſible, and its place ſupplied with dry.

Trenching and Digging

Remember to employ every minute that can be ſpared in digging and trenching the vacant ſpots of ground, that they may be ready to receive the intended crops in the ſpring.

Let the ground be dug one or two ſpades deep, according to the nature of the crop you intend; obſerving to lay it up in ridges till the time you want to plant or ſow it; by which means the ground will be greatly mellowed and enriched.

When the froſt will not admit of digging, let dung be carried to the different parts of the garden where manure is wanting.

The NURSERY.

Management of new Planted Trees.

Your new planted trees, eſpecially thoſe of the more tender kind, will ſtill require attention. If therefore you omitted to cover the ſurface of the ground about their roots with mulch in November, let it be done now; and the ſooner it is done the better.

Remember alſo to ſupport the ſtems of all new planted tall trees with ſtakes, if you omitted it laſt month; for while any tree is rocked to and fro by the wind, there is no hopes of its taking root.

Management of Seedling Exotic Trees.

All ſeedling exotic trees will, while they are young, require ſome ſhelter in ſevere weather. Remember, therefore, to protect them in the manner mentioned laſt month; but never let the covering remain a day longer than there is an abſolute neceſſity.

At the ſame time, remember to cover the beds where your ſeeds, berries, acorns, &c. were ſown in October, or the beginning of November, with peas-haulm, fern, or other dry long litter. And be ſure to do this before the froſt has penetrated far into the ground. This caution will be particularly neceſſary with regard to your beds of acorns, which will ſoon ſhoot after being committed to the ground, and conſequently will be ſoon greatly affected by the froſt.

Dig the Ground between the Rows of Trees and Shurbs.

Every opportunity, when the weather is open, ſhould be taken to dig the ground between the rows of trees and ſhrubs; taking care to bury the weeds properly, and not to injure the roots of the plants.

Digging and Trenching.

Let the digging and trenching ſuch pieces of ground as are intended to be planted with ſhrubs in the ſpring, be now forwarded as much as poſſible. The ground ſhould be laid up in ridges; becauſe the froſt will have much greater power to mellow it, when laid up in that form, than when dug in the common manner: at the ſame time, the rain will not lie upon it ſo long as on ground laid perfectly flat.

The FRUIT-GARDEN.

Prune Apricot, Peach, and Nectarine-Trees.

It is not yet too late to prune apricot, peach, and nectarine-trees: nor will they be much injured even if the weather ſhould prove froſty. If therefore the weather be not very ſevere, theſe trees may be pruned any time this month. Remember to follow the directions laid down in the two preceding months; and to nail up every tree, as ſoon as it is pruned, in a neat and regular manner.

Prune Apple and Pear Trees.

Any time this month will not be too late to finiſh the pruning of your apple or pear trees againſt walls or eſpaliers: for as theſe trees are very hardy, there is not the leaſt danger of their receiving any injury from pruning.

The ſame method muſt be uſed in pruning as was laid down in November.

Prune Vines.

Your vines alſo, whether planted againſt walls or in

vineyards, may now be pruned, obſerving the directions given laſt month.

Prune Standard Fruit Trees.

Remember to examine your ſtandard fruit-trees, whether planted in the garden or orchard, at this ſeaſon; and wherever you perceive any dead or ill-growing branches, let them be taken away.

At the ſame time, where the branches ſtand too cloſe, let them be thinned, obſerving to cut out ſuch as grow the moſt irregular, and alſo thoſe which grow acroſs, or interfere with any of the others.

If you perceive any of the ſmaller branches near the upper part of the tree crowded too cloſe together, let ſome of them be taken away. For theſe trees ſhould be moderately thin of branches, and thoſe kept at regular diſtances. By this means the trees will produce a great quantity of large and handſome fruit.

Prune Gooſeberry and Currant Trees.

Your gooſeberry and currant-trees may ſtill be pruned; obſerving the method laid down the preceding month; namely, to keep the branches thin, and at regular diſtances; to ſuffer no branches to remain that grow acroſs each other, and to take away or ſhorten all ſuch as grow in an irregular manner; to keep the hearts of the trees open, to cut out all dead wood, and very old branches, and to clear away all the ſuckers from the roots.

Prune Raſpberries.

If any of your raſpberry-beds ſtill remain unpruned, let it be done now, obſerving the directions given for that purpoſe in October and November.

Plant Raſpberries.

It is yet not too late to plant raſpberries, provided the weather be open. The manner of preparing the plants, and of ſetting them, has been already deſcribed in the two foregoing months.

Plant Gooſeberry and Currant-Trees.

You may ſtill plant gooſeberries and currants for raiſing a ſupply of young trees. The beſt manner of doing this has been already mentioned in October and November.

Tranſplant Gooſeberry and Currant-Trees.

Gooſeberry and currant-trees may be tranſplanted any time this month into places where they are wanted, provided the weather be open.

Let theſe ſhrubs, if planted round the quarters of the garden, be ſet ſeven or eight feet diſtant from one another.

Tranſplant Fruit-Trees.

You may ſtill tranſplant moſt kinds of fruit-trees, provided the weather be open; for it muſt not on any account be done when the froſt is ſevere.

Management of new planted Fruit-Trees.

Remember to ſecure the roots of your new planted fruit-trees from froſt, by placing mulch, or ſome kind of long litter upon the ſurface of the ground about the trees, laying it as far every way as you think the roots extend.

At the ſame time, let all your new planted ſtandard fruit-trees be ſupported with ſtakes, if not already done; obſerving to put a piece of hay-band round that part of the tree where it is to be faſtened to the ſtake; for this will prevent the bark of the tree from being rubbed off, when rocked by the winds againſt the ſtake.

Management of Fruit-Tree Borders.

This is a very proper ſeaſon for manuring, or adding freſh earth to fruit-tree borders, where either or both are wanting.

Let therefore a quantity of freſh loamy earth be procured, and mixed thoroughly with ſome of the beſt rotten dung. Let this compoſt be laid upon the ground, dug in, and well worked up with the earth of the border. This will encourage the growth of the trees ſurprizingly, particularly ſuch as are in a declining ſtate, ſo that they will produce large, fair, and well-taſted fruit. But the ſooner in the month the borders have this dreſſing, the better.

If you intend to make new borders for fruit-trees, let the ground be dug when the weather is open; obſerving the directions given in the Introduction to this Kalendar.

The PLEASURE or FLOWER-GARDEN.

Carnation Layers.

Your carnation layers that are in pots, ſhould be covered in hard rains, ſnow, and froſts; but remember, when the weather is open, and not very wet, to let the plants have conſtantly the benefit of the free air.

Auricula Plants.

Be very careful to protect your auricula plants from wet, great ſnows, and hard froſts. If they are placed in frames, let the glaſſes be kept conſtantly over them in bad weather; if in a bed under hoops, let mats or canvas be drawn over them.

But whenever the weather is mild and dry, let the plants be conſtantly uncovered; for a free circulation of air is abſolutely neceſſary.

Protect your Beds of Hyacinths, Tulips, Anemones, and Ranunculuſes.

Remember to protect your beds containing your choiceſt hyacinths, tulips, anemones, and ranunculuſes; eſpecially thoſe of the two former, when the weather is very ſevere.

In order to this, ſome peas-haulm, fern, or other dry long litter ſhould be provided; and when the froſt is likely to ſet in hard, let a warm covering of it be laid over the ſurface of the beds; but remember to let it be removed when the froſt is not ſevere.

As ſoon as the plants appear above ground, the beds ſhould be arched over with hoops; and a quantity of large thick mats provided, in order to be in readineſs to be thrown over them in hard weather.

Management of Seedling Plants.

Your ſeedling flower-plants will alſo require ſome attention, in order to protect them from injuries during this inclement ſeaſon.

With

With regard to thoſe ſown in pots or boxes, let them be plunged to their rims or tops in a warm border; and long litter laid on the ſurface, when the froſt is ſevere.

Management of new planted Shrubs.

You muſt remember to protect the roots of your new planted trees and ſhrubs, particularly thoſe of the more tender kind, when the froſts are ſevere.

In order to this, a coat of mulch or long litter of a conſiderable thickneſs, muſt be laid on the ſurface of the ground about each plant.

The ground alſo ſhould be dug between all kinds of flowering ſhrubs, when the weather is open.

Management of hardy Flowering Shrubs in Pots.

Your hardy flowering ſhrubs in pots, ſuch as ſweet-williams, double ſcarlet lychnis, double roſe campion, and other perennial fibrous-rooted plants, will now require attention, to protect them from the ſeverety of the weather.

In order to this, let the pots be plunged to their rims in the earth of a dry warm border, at the beginning of this month. This will prevent the froſt from penetrating to the roots through the ſides of the pot; and with regard to their tops, they muſt covered in very ſevere weather with dry long litter; but let this covering be taken away as ſoon as ever the weather is any thing mild.

If you have any frames to ſpare, the pots containing any of the above fibrous-rooted plants may be plunged into the earth in the frames, and covered occaſionally with the glaſſes.

Prune Flowering Shrubs.

Examine your flowering ſhrubs, and prune all ſuch was want that operation; but let it be done with a knife, not with the garden ſheers.

Remember, in doing this, to let all the long vigorous ſhoots produced laſt ſummer be taken off quite cloſe, together with all ſtraggling branches; and when the branches are crowded, let ſome of them be cut out in a regular manner.

Let every ſhrub be trained and pruned in ſuch a manner, that it may ſtand entirely clear of all the reſt: the branches of different ſhrubs ſhould never be ſuffered to interfere with one another; for their beauty will be conſiderably impaired by being blended together.

As ſoon as the ſhrubs are all pruned, let the ground be dug between them; remembering to take away all the ſuckers, and to ſhorten all the ſtraggling roots as you proceed.

Prune Foreſt-Trees.

This is a very proper ſeaſon for pruning all ſorts of foreſt trees; for it may be performed in froſty weather, when very little other buſineſs can be done.

Plant Quickſets, and other Fences.

Quickſets, and other ſpecies of thorn, may now be planted for rearing fences. And where the hedges are thin or naked at the bottom, they ſhould now be laid down in ſuch a manner as to render them thick in that part.

Propagate Shrubs by Suckers from the Roots.

You may now propagate roſes, lilacs, and ſeveral other ſhrubs of that kind by ſuckers.

In order to which, let the ſuckers be taken up with care from the old plants in open weather, and planted out immediately in rows fifteen inches aſunder; ſome of them will make good plants in two years time.

Tranſplant Foreſt-Trees, and hardy Flowering Shrubs.

When the weather is open, you may ſtill tranſplant foreſt-trees, and the more hardy flowering ſhrubs.

But remember to cover the ground about them with mulch, as ſoon as ever any of them are planted, to keep out the froſt, if any ſhould happen.

Prepare Compoſt.

Let all your heaps of compoſt be now broken up, and the ſeveral parts mixed very well together.

Prepare Ground for planting.

When the weather will permit, let the ground, either in the borders or any other part of the garden, where trees or ſhrubs are intended to be planted, be now well dug.

Roll Graſs and Gravel Walks.

Remember to let your graſs walks and lawns be poled and rolled once a week at leaſt, in mild weather.

Your gravel walks alſo muſt be kept very clean, and rolled now and then when the weather is mild and dry.

SMITHSONIAN MUSEUM
OCT 65

INDEX.

A.

ACorns, 48, 94, 109.
African marigolds, 40, 51, 63, 73.
Alaturnus, 37, 53, 99.
Althea frutex, 50, 98, 106.
Amaranthus, 29, 40, 50, 63, 71.
Anemones, 19, 41, 42, 52, 64, 73, 85, 90, 91, 98, 105, 106, 110.
Annual flowers, 29, 30, 40, 41, 51, 63, 64, 72, 79, 86.
Apples, 16, 39, 61, 69, 103, 104, 109.
Apricots, 17, 39, 61, 62, 67, 69, 77, 78, 84, 90, 95, 103, 109.
Arbutus, 37, 53, 89, 99.
Aromatic plants, 66, 67, 83, 94.
Artichokes, 34, 35, 46, 76, 83, 101, 109.
——— Jeruſalem, 35.
Aſparagus, 12, 20, 33, 34, 46, 82, 94, 101, 107.
Aſters China, 30, 40, 51, 63, 72.
——— perennial, 42, 50, 105.
Auriculas, 12, 29, 31, 41, 52, 53, 64, 73, 80, 90, 97, 106, 110.
Autumn flowering bulbs, 72.
——— crocuſes, 72.

B.

Balſams, 29, 40, 50, 51, 63, 72, 79.
Baſons, in gardens, 4.
Batchelors buttons, 42, 85, 98, 105.
Baum, 47, 94.
Bays, 48, 53, 67, 99.
Beans, 14, 22, 35, 46, 58, 66, 92, 100, 107.
Beech-maſt, 95.
Beets, 22.
Belladona lily, 72.
Biennial flowers, 63.
Borders, 6, 7, 31, 41, 42, 62, 73, 80, 84, 91, 92, 110.
Borage, 47.
Bore-cole, 58, 66.
Box, 31, 42, 53, 73, 80, 83, 86, 91, 100, 106.
Brocoli, 58, 66, 74, 81, 87, 92.
Budded-trees, 48, 49, 60, 62, 68, 70, 77, 78, 83, 84.
Budding, how performed, 67.
Bugloſs, 47.
Bulbous Iris, 80, 98.
——— roots, 19, 41, 42, 52, 64, 80, 85, 86, 90, 98, 105.
Burnet, 36, 47, 67.

C.

Cabbages, 14, 22, 32, 45, 57, 66, 74, 81, 87, 92.
Campanulas, 42, 50, 90, 98, 105.
Camomile, 47, 50.
Candy tuft, 41, 51, 63.
Canterbury bells, 42, 50, 63, 72, 79, 105.
Capſicum, 36, 40, 51, 63, 72.
Cardoons, 37, 67, 88, 93, 102, 108.
Carduus, 47.
Carnations, 18, 30, 41, 42, 52, 63, 64, 70, 71, 79, 84, 91, 97, 99, 106, 110.
Carrots, 15, 22, 32, 46, 57, 66, 76, 82, 92, 100, 108.
Catchfly, 41, 50, 51, 63, 85, 90, 98, 105.
Caterpillers, 63.
Cauliflowers, 13, 21, 32, 45, 58, 65, 74, 81, 86, 87, 92, 100, 108.
Cedar of Libanus, 37, 48, 53, 60, 69, 99.
Celery, 15, 23, 36, 47, 66, 76, 81, 88, 93, 102, 108.
Chamomile, 77, 90, 99.
Cherries, 17, 39, 61, 69, 77, 78, 104.
Chervil, 23, 36, 47, 60.
Chryſanthemums, 40, 41, 57, 63, 71.
Cives, 35, 47.
Clary, 47.
Clearing the ground, 77, 94.
Clip hedges, 92.
Cockſcombs, 29, 50, 72, 79.
Colchicums, 72.
Coleworts, 75, 82, 87.
Columbines, 42, 50, 63, 72, 79, 86, 91, 99, 105.
Convolvulus, 41, 51, 63, 64, 72.
Coriander, 23, 47, 60.
Creſſes. See ſmall Salletting.
Crocuſes, 19, 72, 85, 86, 98, 105.
Crown imperials, 72, 80, 85, 86, 90, 98.
Cucumbers, 11, 31, 44, 45, 54, 55, 64, 65, 74, 80.
Currants, 18, 29, 40, 89, 96, 104.
Cyclamens, 85.
Cypreſs, 37, 48, 53, 60, 67, 99.
Cytiſus, 37, 98, 99.

D.

Daiſies double, 90, 99, 105.
Defending wall fruit, 84, 90.
Digging borders, &c. 6, 7, 31, 42, 62, 73, 80, 84, 91, 92, 109, 111.

Dille,

Dille, 36.
Dung the ground, 94, 102, 103.

E.

Egg-plant, 30, 50, 63, 71.
Endive, 15, 67, 75, 76, 81, 88, 93, 102.
Evergreens, 30, 42, 48, 53, 60, 73, 80, 99.
Exotic trees, 37, 42, 68, 102, 109.

F.

Fennel, 36.
Feverfew, 42.
Fibrous-rooted plants, 30, 63, 72, 85, 90, 98.
Ficoides, 30, 50.
Fig-trees, 38, 77, 84.
Filbert-trees, 105.
Firs, 37, 53, 68, 69, 77, 83, 99.
Flos Adonis, 41, 51, 63.
Flower-garden, 8, 18, 29, 40, 50, 63, 70, 79, 84, 90, 97, 105, 110.
Flowering plants, 19, 29, 30, 31, 48, 73, 80, 91, 98, 106, 111.
Foreft-trees, 99, 106, 111.
Fox-gloves, 42, 63, 72, 99.
French-honeyfuckle, 42, 50, 63, 79, 99, 105.
——— marigold, 40, 51, 63, 73.
Fritillarias, 85, 86, 90, 98.
Fruit-garden, 5, 16, 24, 38, 49, 61, 69, 78, 84, 89, 95, 103, 109.

G.

Gardens, their utility, 3.
Garlick, 23, 35, 82.
Gathering apples and pears, 90, 97.
——— feeds, 77, 83, 86.
Gentianella, 50, 90, 99, 105.
Golden-rod, 42, 50, 99, 105.
Goofeberries, 18, 29, 40, 89, 96, 104, 110.
Gourds, 56.
Grafted trees, 48, 49, 60, 62, 68, 77.
Grafting, how performed, 26, 48.
Grafs walks, 31, 44, 53, 64, 73, 80, 86, 92, 100, 106, 111.
Gravel walks, 43, 53, 64, 73, 80, 86, 92, 106, 111.
Greek Valerian, 50, 63, 72, 79, 99, 105.
Guernfey lilies, 72.

H.

Hardy trees and fhrubs, 37.
Hamburg parfley, 23, 37, 59.
Haws, 94.
Hazle nuts, 105.
Hedges, 92.
Hepaticas, 99.
Herbs for diftillation, 67, 77, 83.
——— for drying, 67, 77, 83.
Hips, 94.
Hollies, 37, 48, 53, 67, 94, 99.
Hollihocks, 42, 63, 79, 99, 105.
Honeyfuckles, 29, 42, 50, 53, 98, 99, 100, 105, 106.
Horfe-radifh, 23.
Hot-beds, 11, 88, 107.

Hyacinths, 18, 31, 41, 42, 52, 64, 72, 73, 90, 98, 106, 110.
Hyffop, 23, 36, 47, 60, 66, 67, 76, 80, 94.

I.

Jafmines, 53, 77, 98, 106.
Jerufalem artichoke, 35,
Inarching, 28, 48.
Indian pinks, 63, 72.
Inoculating. See Budding.
Infects, 50, 62, 79, 90.
Jonquils, 19, 72, 86, 98.
Iris, 80, 85, 86, 90, 98.
Juniper, 37, 69, 99.

K.

Kidney beans, 22, 35, 45, 56, 66, 75.
Kitchen-garden, 4, 11, 20, 31, 44, 54, 64, 74, 80, 86, 92, 100, 107.

L

Larkfpur, 41, 51.
Lavetera, 51, 63.
Lavender, 36, 47, 60, 66, 67, 83.
——— cotton, 47, 66, 67.
Laurels, 53, 89, 94, 99, 100.
Laurufinus, 37, 53, 89, 94, 99.
Layers, 29, 60, 71, 79, 84, 91, 95, 99, 106, 110.
Leeks, 33, 47, 66.
Lettuces, 13, 22, 33, 47, 57, 66, 67, 76, 82, 87, 93, 102, 108.
Lichnidea, 41, 50, 51, 66, 72, 98.
Lilacs, 53, 98, 99, 106.
Lily, 80, 85, 86, 98.
Lobels, 51, 63.
London Pride, 50, 90, 99, 105.
Love-apples, 41, 59, 63, 71.
Lupins, 41, 51, 63.
Lychnis, 41, 50, 51, 63, 72, 79, 80, 85, 90, 98, 105.

M.

Manure the ground, 94, 102, 103.
Marigolds, 36, 47, 66.
——— African, 40, 51, 63, 71.
——— French, 40, 51, 63, 71.
Marjoram, 23, 47, 66, 67, 83.
Martagons, 85, 98.
Marvel of Peru, 30, 40, 63, 71, 72.
Maftic, 60, 83.
Melons, 11, 29, 31, 44, 45, 55, 56, 65, 74, 81.
Mignonette, 40, 63.
Mint, 14, 35, 47, 60, 66, 67, 94.
Monkfhood, 42, 90, 99, 105.
Mufhrooms, 16, 23, 88, 109.
Muftard. See Small Salladings.

N.

Nafturtiums, 37, 47, 51, 63, 64.
Narciffufes, 19, 72, 80, 85, 86, 98, 105.
Nectarines, 17, 39, 49, 61, 62, 67, 77, 78, 84, 90, 95, 103, 104, 109.

New plantations, 60.
Nurſery, 8, 20, 25, 37, 48, 60, 67, 77, 83, 89, 94, 102, 109.

O.

Onions, 33, 36, 47, 59, 66, 75, 76, 82, 87, 102.
Orchard, 8, 16.
Oriental Mallows, 41, 51, 63.

P.

Palma Chriſti, 40, 71.
Parſley, 14, 23, 36, 47, 59.
Parſnips, 32, 66, 100.
Peaches, 17, 39, 49, 61, 62, 67, 69, 77, 78, 84, 90, 95, 103, 109.
Pears, 16, 35, 39, 61, 69, 77, 103, 104, 109.
Peas, 15, 22, 46, 58, 59, 93, 100, 107.
Penny-rogal, 36, 47.
Perennial flowers and plants, 42, 50, 63, 72, 79, 80, 86, 105.
Perſicarias, 41, 63, 71.
Perſian iris, 66, 98.
Phillyrea, 37, 53, 89, 99.
Pinks, 42, 50, 52, 63, 71, 91, 99.
Pionies, 90, 105.
Planting, preparations for, 83, 89, 90, 103, 105, 111.
Pleaſure-Garden. See Flower-Garden.
Plums, 17, 39, 61, 69, 103, 104.
Plumſtones, 94.
Polianthuſes, 50, 53, 80, 85, 90, 99, 105.
Poppy dwarf, 41, 63.
Portugal laurel, 53, 89, 95, 99, 100.
Potatoes, 23, 35, 46, 101.
Potherbs, 47, 59, 66, 67.
Primroſe, 50, 105.
Pruning, 24, 29, 38, 39, 40, 49, 61, 69, 77, 80, 83, 86, 95, 96, 97, 99, 103, 104, 106, 109.
—— apples, 24, 39, 61, 103, 109.
—— apricots, 38, 61, 95, 103, 109.
—— cherries, 24, 39, 61, 104.
—— currants, 24, 40, 46, 104, 110.
—— figs, 38, 77.
—— gooſeberries, 24, 40, 96, 104, 110.
—— nectarines, 39, 61, 95, 103, 109.
—— peaches, 39, 61, 95, 103, 109.
—— pears, 24, 39, 61, 103.
—— plums, 39, 61, 103.
—— raſpberries, 25, 40, 97, 104, 110.
—— vines, 25, 40, 49, 61, 69, 77, 104, 109.
Pumpkins, 56,
Purſlane, 36, 47, 59.
Pyramidal campanulas, 63, 72, 79.

Q.

Quince-trees, 105.

R.

Radiſhes, 12, 23, 33, 46, 59, 75, 82, 93, 101, 108.
Ranunculuſes, 19, 41, 42, 52, 64, 73, 85, 90, 91, 98, 105, 106, 110.
Rape. See Small Sallading.
Raſpberries, 18, 25, 40, 97, 104, 105, 110.
Roſes, 99, 106.
Roſe-campion, 41, 50, 63, 72, 79, 85, 90, 98, 105.
Roſemary, 36, 47, 60, 66, 67, 83.
Rue, 36, 47, 60, 66, 67, 83.

S.

Sage, 36, 47, 60, 66, 67, 76, 83, 94.
Saſſafy, 23, 37, 47, 59, 105.
Savory, 23, 36, 47, 60, 66, 67, 76, 83, 94.
Savoys, 22, 45, 57, 66, 81.
Scabiouſes, 41, 50, 51, 63, 71, 86, 99.
Scarlet lychnis. See Lychnis.
Scorzonera, 23, 37, 47, 59.
Seedling flowers and plants, 19, 60, 69, 72, 83, 91, 99, 102, 106, 109, 110.
Sena, bladder, and ſcorpion, 53, 98, 106.
Shallots, 23, 36, 82.
Skirrets, 37.
Small Sallading, 13, 36, 47, 57, 66, 67, 75, 87, 93, 101, 108.
Snail flowers, 51, 63.
Snails, 62, 70, 79.
Snow-drops, 98.
Sorrel, 36, 47, 94.
Southernwood, 36, 47, 66.
Spear-mint. See Mint.
Spinage, 16, 23, 33, 46, 75, 81, 87, 93, 101.
Spring crocus. See Crocus.
Standard fruit-trees, 70, 104, 105, 110.
Starwort, 63.
Stock july-flowers, 41, 42, 50, 63, 72, 79, 86, 91, 99, 105.
Stocks, ten-week, 30, 41, 63, 72.
—— to graft and bud upon, 25, 89, 95.
Strawberries, 25, 40, 50, 70, 89, 96, 97.
Strawberry-tree. See Arbutus.
Stramonium, 41, 50, 71.
Sunflowers, 41, 42, 51, 105.
—— dwarf, 41, 51, 63.
Sweet herbs, 66, 67, 83, 94.
Sweet-ſcented peas, 51, 63, 64.
Sweet-ſultan, 41, 51, 63.
Sweet-williams, 19, 41, 42, 50, 63, 71, 72, 79, 84, 86, 91, 98, 105.
Syringas, 53, 98, 106.

T.

Tamatos. See Love-apple.
Tangier peas, 51, 63, 64.
Tanſey, 94.
Tarragon, 47, 94.
Ten week ſtocks. See Stocks.
Thrift, 50, 53, 86, 90, 99, 100.
Thyme, 23, 36, 47, 66, 67, 94.
Tobacco Plant, 71.
Tranſplanting, 29, 30, 31, 40, 42, 48, 53, 63, 65, 66, 67, 72, 74, 76, 77, 79 81, 82, 83, 84, 86, 87, 89, 90, 92, 95, 96, 103, 104, 105, 106, 110, 111.
Tree amaranthus, 71.
Tree-primroſe, 42, 63, 72, 79, 99, 105.
Trench-ground, 4, 94, 109.
Tricolars, 29, 72, 79.
Trimming flowering plants, 73, 94, 111.

Sir Lansdown's Bookplate Manchester

INDEX.

Tulips, 19, 31, 41, 52, 64, 72, 90, 98, 105, 106, 110.
Turf, 31, 44.
Turnip-rooted radish, 75.
Turnips, 46, 57, 65, 75, 82, 87.

V.

Venus-looking-glass, 41, 51, 63.
——— navelwort, 41, 51, 63.
Vines, 16, 25, 38, 40, 49, 61, 69, 77, 84, 89, 104, 109.
Vineyards, 49, 62, 69.
Virginia stocks, 51, 63.

W.

Wall-flowers, double, 19, 41, 42, 63, 98, 91, 105.
Watering, 60, 63, 67, 69, 70, 78, 83, 86.
Weeds, 48, 54, 60, 61, 64, 69, 73, 77, 78, 80, 83, 84, 89.
Wormwood, 47.

Y.

Yew-berries, 94.
Yew-trees, 37.

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